

# PLANT BREEDING ABSTRACTS

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**PLANT  
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\* General studies, see also individual crops.



# Plant Breeding Abstracts

Vol. XXII, No. 1

## \*STATISTICS

1. BLENK, H.  
Grundsätzliche Betrachtungen zur Varianzanalyse. (**Basic considerations to the analysis of variance**).  
Z. Pflanzenz. 1951 : 30 : 122-42.

An exposition on the analysis of variance technique applied to one and three-way classifications, Latin and Graecolatin squares, is given with practical examples.

2. ATANASIU, N.  
Die Auswertung der landwirtschaftlichen Feldversuche. (**The evaluation of agricultural field trials**).  
Z. Pflanzenz. 1951 : 38 : 112-21.

The application of analysis of variance to field trials is discussed, taking as an example a trial involving four varieties grown in four replications on four plots with variable soil.

The conclusions are that by applying analysis of variance in the calculation of yields, it is possible to a certain extent to eliminate variance due to soil, variety and other influences, but the individual and mean yields are not entirely freed from effects due to variation in the soil by this method of calculation. Moreover, calculation of average yields is generally attempted by using a suitable arrangement, Fisher's or the random lay-out, of the varieties in the plots, but the author's study shows that this is only possible when the soil increases or decreases in quality regularly.

3. CONAGIN, A.  
Delineamentos experimentais. (**Experimental designs**).  
Rev. Agric., S. Paulo 1951 : 26 : 87-108.

An outline is given of the many advantages of statistical treatment in carrying out agricultural experiments and of the most important points to which the experimenter should give attention.

4. LEIN, A.  
Bemerkungen zu neueren Arbeiten über Fragen des Feldversuches. (**Observations relating to the newer work on problems of the field trial**).  
Z. Pflanzenz. 1951 : 38 : 89-111.

The author deals critically with some of the older and the more recent work on methods of making and evaluating field trials. The work of Mudra, von Bogoslawski and Mitscherlich and

the terminology used in statistical calculations are surveyed at length and discussed.

## \*GENETICS

5. ASHBY, E.  
**Science in Russia—1. The contributions of Russian botanists.**  
Discovery 1951 : 12 : 209-10.

Reference is made to the compilation of the flora of the USSR, to Maximov's work on drought resistance in plants, to work on photoperiodism and growth substances, and to Krenke's theory of cyclic senescence, with a very brief mention of the genetics controversy.

6. BABCOCK, E. B.  
**The development of fundamental concepts in the science of genetics.**  
Port. Acta Biol. 1949 : Ser. A : R. B. Goldschmidt Vol. : Pp. 50.

A general survey of the progress of genetical research since the first publication of Mendel's papers traces outstanding contributions to the concepts of the material basis and mechanism of heredity and the constancy or relative stability of genes; progress is also traced in respect of artificial induction of mutations, cytogenetics, experimental taxonomy, population genetics and chemical analysis of the gene.

7. HADORN, E.  
Fünfzig Jahre Vererbungsforschung. (**Fifty years of genetic research**).  
Verh. Schweiz. Naturf. Ges. 1950 : 66-76.

A general review is presented of the history of genetics in the last fifty years.

8. SPARROW, A. H. and RUBIN, B. A.  
**Effects of radiations on biological systems.**  
US Atom. Energy Comm. 1951 : AECU-1207 : Pp. 94. [from Nuclear Sci. Absts. 1951 : 5 : Abst. 2985].

The abstract refers to an extensive review covering types of radiation, radiation dosage units, mechanisms of transfer of radiation energy, the target theory, relation between chemical and biological effects of radiation, effects of radiation on microorganisms, cytological and genetical effects, carcinogenesis, physiological and embryological effects, and factors determining sensitivity to radiation.

\* General studies, see also individual crops.



## 9. MATHER, K.

**The genetical architecture of heterostyly in *Primula sinensis*.**

Evolution, Lancaster, Pa 1950 : 4 : 340-52.

Heterostyly in *P. sinensis* depends upon the "switch" gene pair *Ss*, whose segregation is responsible for the normal variation giving rise to heterostyly as an outbreeding mechanism, and also upon two types of genes forming a genetic background. One type includes the pairs *Aa* and *Mm*, which, according to their composition as regards dominance and recessiveness, are capable of altering the expression of *Ss* so as to replace heterostyly by homostyly, or of transforming a pin type (*ss*) into a pseudothrum and a thrum plant (*SS*) into a superthrum. The other type comprises genes which bring about fine adjustments rather than main variations, e.g. the pair *Chch* affecting corolla shape. These conclusions are based chiefly upon the results of an analysis of morphological subcharacters of heterostyly. The genic analysis of the physiological subcharacter of heterostyly, incompatibility, is less complete. A genetic background, similar to that controlling the morphological subcharacters, may determine the precise nature and efficiency of incompatibility primarily governed by *Ss*. The expression of heterostyly, it is further suggested, has been adjusted by natural selection in the wild ancestors of cultivated *P. sinensis*; this adjustment may have proceeded, at least to some extent, independently in the various subcharacters. The observations of Ernst on other species of *Primula* have led to the view that the gene pair *Ss* is composite. *Aa* and *Mm* in *P. sinensis* affect the style and anthers in much the same way as the subgenes of *Ss* recognized by Ernst. In *P. sinensis* the raw materials of the switching system were perhaps brought together by a small inversion or other means of suppressing recombination; such a structural integration into a supergene would form an efficient basis for the functioning of the switching mechanism and thus be favoured in selection.

## 10. DE HAAN, H.

**Het ontstaan van polymerie. (The origin of polymerism).**

Studiekring voor Plantenveredeling (Plant Breeding Study Circle) 25 November 1947 Wageningen : 177-79. (Mimeographed).

Genetic analysis of the garden pea established that multiple equipollent hereditary factors

exist for various characters. Polymeric factors may or may not have a cumulative mode of action. The condition is commonly caused by polyploidy. Such factors are identical and located in different chromosomes.

## 11. MICHAELIS, P.

**Plasmaverbung und Heterosis. (Cytoplasmic inheritance and heterosis).**  
Z. Pflanzenz. 1951 : 30 : 250-75.

The main problem discussed is whether Jones's theory of heterosis is the only valid one or whether Shull's older hypothesis should also be taken into account.

Research on plasmatic inheritance in *Epilobium* has shown that besides the heterosis caused by a favourable combination of dominant, linked genes, there is another type of heterosis due to favourable recombinations of the plasmatic heritable components or to favourable combinations of plasmons and genomes. In addition a stimulatory effect due to slight developmental disharmony between the heritable components may be operative. The latter possibility would accord with Shull's definition of heterosis.

## 12. BAKER, H. G.

**Hybridization and natural gene-flow between higher plants.**

Biol. Rev. 1951 : 26 : 302-37.

Literature concerning the genetical and cytological analyses by which natural hybridization has been recognized and distinguished from intrinsic variation and mutation is reviewed, with particular emphasis on the fact that natural hybridization is more wide spread and has greater influence on populations than had been formerly supposed.

Although many pairs of species are capable of forming hybrid swarms in which genes are readily interchanged, such mutual gene transference is often restricted by internal and external factors. Restrictive internal factors discussed include physiological unbalance, habitual self pollination, facultative apomixis, reduction in seedling establishment by crowding due to vigorous vegetative reproduction, plasmon sensitive genes which are not easily transferred, competition between pollen tubes during which the stylar tissue "favours" those tubes derived from grains of the same species, multifactorial inheritance and linkages which limit the number of different recombinations and affect the frequency of certain recombinations, dissimilarity in floral morphology, and phenological differences. External factors which restrict the interchange of genes include overdispersion and massing to form an almost pure



stand, thus promoting inbreeding rather than outbreeding, and ecological isolation. The influence of the anthropological factor in disturbing the habitat to create a low selection pressure is discussed with respect to the establishment of hybrid swarms.

It is emphasized that genes of importance in the ecological distinction between two forms tend to flow less readily after natural hybridization than those genes whose function is not connected with adaptation to ecological niches. A theoretical scheme has been devised describing the stages by which an area containing one form may be invaded by another interfertile form; field observations concerning the invasion by *Melandrium album* of areas supporting *M. dioicum* are cited. It is supposed that one form will be ultimately eliminated except for a few genes remaining in populations of the other.

13. WULFF, H. D.  
*Rosa Kordesii*, eine neue amphidiploide Rose. (***R. Kordesii*, a new amphidiploid rose**).  
Züchter 1951 : 21 : 123-32.

This amphidiploid rose (*R. rugosa* x *R. Wichuriana*), which is also a structural hybrid owing to segmental interchange between the chromosomes, is described morphologically and cytologically. The results of a study of the inheritance and segregation phenomena suggest that the chromosomes taking part in the interchange carry some of the hereditary factors conditioning flowering and fruiting.

14. MICHAELIS, P.  
Prinzipielles und Problematisches zur Plasmavererbung. (**The principles and problems of plasmatic inheritance**).  
Biol. Zbl. 1949 : 68 : 173-95.

The main results of researches by the author and other workers on plasmatic inheritance are summarized. The constancy of the plasmon, the significance of its constancy in relation to physiological and developmental processes and the possibility of alteration occurring in the plasmon are discussed.

The following conclusions are drawn. The cytoplasm must contain a number of different heritable constituents; by blending during fertilization and separation during cell division, these constituents might recombine in a different way. As long as a discrete distribution of the plasmon constituents during cell division cannot be proved and if the various plasmotypes have already in the cells and tissues different selection values, then, theoretically, the possibility exists of controlled hereditary adaptation of the

individual plant by selection of the various plasmotypes.

15. ANDERSON, E.  
**Concordant versus discordant variation in relation to introgression.**  
Evolution, Lancaster, Pa. 1951 : 5 : 133-41.

The proportion of any two dimensions of one part or the proportion of one part to another morphologically related part, assumes a characteristic value in each species. Variation determined thus, which is harmonious visually and different for each species, is described as concordant. When interspecific hybridization occurs, the variation in the  $F_2$  progeny lacks the apparently harmonious relationships shown by the pure species and becomes discordant, each plant showing its own particular pattern of variation. Introgression is recognizable by the discordant variation in the population. Unless introgression is very severe, however, the occurrence of hybridization may not be clearly evident. Thus experiment and population analysis should be used for assaying introgression, and for confirming subjective evaluations of the status of populations.

16. BOAG, J. W.  
**On the interpretation of the dose-frequency curve in radiogenetics.**  
Genetics 1951 : 36 : 281-84.

Opatowski's assertion (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1342) that the experimental data of Spencer and Stern (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 2028) are compatible with a multiple hit theory is criticized on mathematical grounds.

17. HERSKOWITZ, I. H.  
**A list of chemical substances studied for effects on *Drosophila* with a bibliography.**  
Amer. Nat. 1951 : 85 : 181-99.

Chemicals tested for their phenotypic and genotypic effects upon *Drosophila* are listed, together with the corresponding bibliographical references.

18. VISCONTI DI MODRONE, N.  
Azione letale e azione mutagenica della metil  $\beta\beta'$  dicloroetilammmina su spore di *Aspergillus niger*. (**The lethal and mutagenic action of methyl  $\beta\beta'$ -dichloroethylamine on the spores of *A. niger***).  
Nuovo G. Bot. Ital. 1948 : 55 : 413-20.

The lethal effect of nitrogen mustard on the spores of *A. niger* follows a two-hit curve, which



can be interpreted in terms of the target theory, assuming that decreased lethality depends on inactivation of the reagent with time. Diluting the spore suspension with glycine and sodium bicarbonate inhibits lethality, which is also lowered by reduction in temperature. Many mutants were observed in the colonies that developed from the treated spores.

19. MALY, R.  
Cytomorphologische Studien an strahleninduzierten, konstant abweichenden Plastidenformen bei Farnprothallien. (**Cytomorphological studies on constant aberrant plastid forms induced by irradiation in fern prothalli**).  
Z. indukt. Abstamm.- u. VererbLehre 1951 : 83 : 447-78.

Prothalli of *Polypodium aureum* arising from spores irradiated with X rays,  $\gamma$  rays or ultraviolet rays displayed a variety of plastid abnormalities, affecting form, size, structure and pigment content. They remained constant over a number of years of vegetative reproduction. No difference was detectable between the alterations produced by the three types of rays and although crossing experiments have not yet been made it is thought that the effects are genic rather than cytoplasmic.

20. HARTE, C.  
Untersuchungen über labile Gene. I. Selektionsversuche an *Antirrhinum majus* mut. *fimbriata*. (**Investigations on labile genes. I. Selection experiments on *A. majus* mut. *fimbriata***).  
Z. indukt. Abstamm.- u. VererbLehre 1951 : 83 : 392-413.

The *fimbriata* mutant is extremely variable in its expression, both in different plants and in different flowers upon the same plant. The progeny of flowers of different type from the same plant were also different and a correlation was established between the floral type of the progeny and that of the flower from which it came. These differences were maintained in the following generations. A correlation between the average floral type of the mother plant and of its progeny was also observed, though it was not so high as that with individual flowers. Observations on the progeny of a cross between a *fimbriata* and a normal plant showed the normal allele to be fully dominant. In the  $F_2$ , 3 of the progenies gave 3 : 1 ratios, whilst the other two showed a clear deficiency of *fimbriata* types.

The genetic differences which these experiments have shown to exist both between the plants

and within the plants are ascribed to lability on the part of the *fimbriata* gene. The variations are not controlled by environmental influences but only by the variation of the gene. The plants in which the *fimbriata* character was least strongly expressed produced larger numbers of offspring than the strongly *fimbriata* types, so that if no selection for the character occurred it would gradually disappear from a population.

21. LEROY, A.  
Mitchourine et le mitchourinisme. (**Mičurin and Mičurinism**).  
Rev. Hort. Suisse 1951 : 24 : 244-49.

Extracts are given from the published work of Mičurin, in such a way as to provide an outline of his principles. The extracts are prefaced by a remark of Daniel, that to believe that variation resulting from grafting does not exist is the error of the moderns, to believe that it is all-powerful the error of the ancients, while the truth lies somewhere between these two extremes.

## EVOLUTION

22. BABCOCK, E. B.  
**Study of evolution aided by research on genus *Crepis***.  
Calif. Agric. 1947 : 1 : No. 7 : p. 3.

The relative influences of time, environment and isolation on the evolution of 196 species of *Crepis* are discussed. Results of research in the USA concerning genetical isolation of species should be of value in crop breeding.

23. KRUCKEBERG, A. R.  
**Intraspecific variability in the response of certain native plant species to serpentine soil**.  
Amer. J. Bot. 1951 : 38 : 408-19.

The distribution and intraspecific variability of certain Californian species, particularly *Streptanthus glandulosus*, are used to support the theory of biotype depletion by which serpentine endemics may have evolved. Strains showing differences in tolerance of serpentine soil are edaphic ecotypes.

24. LAMBERT, J. G.  
Faits et idées d'hier et d'aujourd'hui en matière d'évolution et d'hérédité. (**Facts and ideas of yesterday and today in evolution and heredity**).  
Ann. Gembl. 1951 : 57 : 1-22; 61-81; 121-40.

The history and development of the theory of evolution and inheritance are reviewed from its beginnings in the seventeenth century up to the



present time, when the biochemical study of genetic variation has opened up new avenues of research.

25. RUTISHAUSER, A.  
Über die Entwicklungsgeschichte pseudogamer Potentillen. (**On the ontogeny of pseudogamous *Potentilla* species.** Arch. Klaus-Stift. VererbForsch. 1943 : 18 : 687-91.

In many species of *Potentilla* the progeny obtained from cross pollinations consist solely of plants phenotypically identical with the female parent. From a genetic study of this phenomenon the author came to the following conclusions. Though the egg cells of most pseudogamous *Potentilla* forms can develop without external stimulus, the parthenogenetic embryos are morphologically abnormal and incapable of germination. Embryo development is regulated not by the pollen but by the endosperm. Moreover, the secondary nucleus of the embryo sac cannot develop autonomously, but requires the stimulus of pollination. In spite of the marked tendency to parthenogenetic development in pseudogamous *Potentilla* forms, the unreduced egg cells of many races of *P. verna* and *P. argentea* have not completely lost the capacity for fertilization and the "diploid" egg cell may be fertilized by a "haploid" generative nucleus. The hybrids between aposporous and pseudogamous races of *P. verna* are, in all probability, pseudogamous and all represent constant races morphologically intermediate between the parents but having some new characteristics, e.g. a different chromosome number and consequent enlargement of all organs.

#### \*CYTOLOGY

26. SHARMA, A. K. and CHITRA GHOSH.  
**Oxyquinoline—its possibilities in other cytological procedures.** Sci. and Cult. 1951 : 16 : 528-30.

Oxyquinoline has been found useful (1) when added to Nawaschin's fluid, (2) in Feulgen staining, and (3) in Feulgen Light Green staining.

27. TIWARY, N. K. and SHRIVASTAVA, S.  
**A note on an interesting correlation between nuclear, lignin and exine stains.—VI.** Sci. and Cult. 1951 : 16 : 325-26.

The exine of the pollen grain, the nucleus and

lignin stain with basic dyes; the intine of the pollen grain, the cytoplasm and cellulose walls with acidic dyes.

28. CHIARUGI, A.  
Centro di studio per la citogenetica vegetale. Attività svolta durante gli anni 1947-48, 1948-49, 1949-50. (**The study centre for cytogenetics of plants. Its activities during the years 1947-48, 1948-49, 1949-50.**) Ricerca Scientifica 1950 : 20 : 1417-41.

This study centre, which forms part of the botanical institute of the University of Pisa, was founded in 1947 and the present outline of its activities refers to research on cytogenetic methods, on the chromosome numbers and caryology of special systematic and phylogenetic groups, on chromosome mutations, on apomixis and allied phenomena, on somatic meiosis, on polyploidizing agents and chemical mutagens and new points of view concerning their action, alone and in combination, on endopolyploidy in root, bulb and tapetal tissues, and on the physiological effects of polyploidy.

A list of 90 published works emanating from the centre, including contributions by the author, F. D'Amato, M. G. Avanzi and E. Battaglia, is given at the end of the review.

29. MOSES, M. J.  
**Absorption spectrum of the Feulgen-nuclear complex in vitro and in situ.** US Atom. Energy Comm. [undated] : AECU-1163 : Pp. 2. [from Nuclear Sci. Absts. 1951 : 5 : Abst. 3287].

In view of the wide use of the Feulgen reaction as a quantitative measure of the desoxypentose nucleic acid of nuclei, fuller information on the chemical nature of the reaction is required. Spectrophotometric measurements of the absorption spectra obtained from the Feulgen reaction in hydrolysed solutions of desoxypentose nucleic acid and in pollen mother cell nuclei of *Trillium erectum* were made. The spectra showed two maxima in both cases, sharply separated in the spectrum of the nucleus but not in that obtained with the solution. The significance of the two maxima and the reason for their marked differentiation in the cytological sections is not understood. The characteristic spectrum of the reagent when regenerated by formalin showed only one sharp peak.

\* General studies, see also individual crops.



30. MARSHAK, A.  
**Absence of cytosine in bacteriophage T<sub>2</sub>.**  
Proc. Nat. Acad. Sci., Wash. 1951 : 37 : 299-303.  
Absence of cytosine in the desoxyribonucleic acid of bacteriophage T<sub>2</sub> is reported. The significance of this result in relation to the general supposition that desoxyribonucleic acid has a highly uniform composition in widely different organisms and is of fundamental significance for gene action is discussed.
31. SERRA, J. A.  
**Contributions to a physiological interpretation of mitosis and meiosis. I. The composition of the resting stage nucleus.**  
Port. Acta Biol. 1947 : 2 : 25-43.  
The nucleoplasm is rich in saturated lipids; it possesses basic proteins which are more abundant in older cells; it possesses also non-basic proteins and sulphur compounds closely bound to proteins. The lipids are probably conjugated with proteins.
32. CERUTI, A.  
L'acido nucleinico in rapporto al reticolo nucleare. (**Nucleic acid in relation to the nuclear reticulum**).  
Nuovo G. Bot. Ital. 1948 : 55 : 155-56.  
Observations are reported suggesting that nucleic acid is associated with the nuclear reticulum and not with the intervening nucleoplasm.
33. REITBERGER, A.  
Chromozentrenuntersuchungen. I. Mitteilung. Über die Struktur junger Ruhekerne verschiedener Valenz bei vier Kruziferenarten. (**Chromocentre investigations. I. On the structure of young resting nuclei of different degrees of polyploidy in four species of crucifers**).  
Chromosoma, Berlin 1951 : 4 : 205-21.  
In *Sinapis alba*, *Raphanus sativa*, *Brassica Rapa* and *B. oleracea* the number of chromocentres was determined from a study of young 1n, 2n 3n, 3n + 2, 4n, 8n, 16n and 32n resting nuclei from different kinds of primary meristems of numerous plants at different stages of development. The nuclei examined were from gametophytes and sporophytes of diploids and tetraploids, and from colchicine treated root-tips of diploids. In all cases the number of chromocentres agreed with the chromosome number.
34. PRAKKEN, R. and SWAMINATHAN, M. S.  
**Experience with the hydroxyquinoline smear method.**  
Meded. LandbHoogesch. Wageningen 1951 : 50 : 137-40.  
Pretreatment with 8-hydroxyquinoline, before fixing in HCl and staining with acetic orcein, is recommended for studying somatic chromosomes in smears of species with small and crowded chromosomes. Treatment causes contraction and spreading of the chromosomes, thus facilitating counts and detailed morphological studies. The method has been used with advantage for studying chromosomes in the genus *Solanum*, to determine the chromosome numbers of young leaves, and to pick out polyploids.  
Having noted c-mitotic effects in a number of smears, seedlings of *Lactuca sativa*, *Spinacia oleracea* and *Allium Cepa* were treated with varying doses of 8-hydroxyquinoline; polyploidy was not, however, induced.
35. BAILEY, P. C.  
**A study of the chromosome morphology of some species of *Trillium*.**  
Bull. Torrey Bot. Cl. 1951 : 78 : 324-30.  
An attempt has been made to classify five species of *Trillium* from Alabama and the standard *T. luteum* on the bases of comparative measurements of the length of individual chromosomes, their arm length ratios and the total length of chromosomes in each complement. Although the latter measurement was used to form three different groups, variations in chromosome morphology were insufficient to separate the six species. Further analyses of arm length ratios are being undertaken.
36. HÖVERMANN, I.  
Über Strukturveränderungen an Chromozentrenkernen unter dem Einfluss von Aminosäuren und ähnlichen Substanzen. (**On structural changes in chromocentre nuclei under the action of aminoacids and similar substances**).  
Planta 1951 : 39 : 480-99.  
The addition of various aminoacids to sterile root tip cultures of young undifferentiated nuclei of *Impatiens balsamina* and *Sinapis alba* resulted in an increase in the heterochromatin content of the nuclei and a similar action was observed with peptone, glucosamine and asparagine. Of the typical histone constituents of protein only arginine showed this effect, which was very marked.



The hyperchromatic nuclei were not polyploid and showed normal diploid mitoses, but all divisions were more numerous and growth and development of the cultures were often intensified.

The results are interpreted as indicating the identity of the "secondary" chromocentres often observed in very active cells and the normal chromocentres of the resting nucleus.

37. RESENDE, F.  
**Karyokinesis.**  
 Port. Acta Biol. 1947 : 2 : 1-24.

In the course of detailed description of mitosis and meiosis in plant cells, it is noted that (a) no uncoiling takes place between telophase and the resting stage; (b) in early mitotic prophase, the spirals are equivalent to those of the preceding telophase in diameter and length; (c) the nucleolar zone of the chromosome probably has the same chemical composition as the nucleolus, namely, heterochromatin minus thymonucleic acid; (d) interchromatidic breakage and fusion have been observed in somatic mitosis of *Aloe mitriformis* var. *Commelinii*; (e) mitosis and chromonemata multiplication are independent phenomena, for cases have been observed where meiosis II resembles mitosis in all respects save chromonemata multiplication, and (f) the mitotic chromosome generally consists of two strands, but variation between 1, 2 and 4 strands may occur synchronously within the same chromosome set, or even within the same chromosome.

38. DEYSSON, M.  
 Action du saponoside de l'*Aesculus Hippocastanum* L. sur la division des cellules végétales. (**The action of the saponoside of *Ae. Hippocastanum* L. on the cell division of plants**).  
 Bull. Soc. Bot. Fr. 1951 : 98 : 138-41.

DEYSSON, M.  
 Action des saponosides du *Polygala senega* L. et de l'*Hedera Helix* L. sur la division des cellules végétales. (**The action of the saponosides of *P. senega* L. and of *H. Helix* L. on the cell division of plants**).  
 Ibid. 1951 : 98 : 150-52.

Detailed accounts are given of the inhibitory action of the above mentioned saponosides upon mitosis in root meristems of *Allium Cepa*.

39. SERRA, J. A.  
**Contributions to a physiological interpretation of mitosis and meiosis. II. The prophasic appearing of the chromonemata and the spiralization.**  
 Port. Acta Biol. 1947 : 2 : 45-90.

At the beginning of prophase, nucleotides and basic proteins are synthesized, especially in the cytoplasm adjacent to the nuclear membrane. They pass through the membrane and are deposited on the chromonemata, ribonucleotides probably being converted into thymonucleic acid in the nucleoplasm.

The chromonemata are probably of uniform thickness but may appear beaded due to differential deposition of nucleoprotein. The unequal deposition in turn is probably due to the alternation along the length of the chromonema of bands of nucleoprotein and nonbasic proteins.

The colloidal properties of the chromosome probably derive from the degree of polymerization of the peripheral nucleoprotein. Contraction in length of the chromosome may follow spiralization, itself a consequence of gelification of the peripheral nucleoprotein, and also submicroscopic folding of the protein chains.

40. DUEFEL, J.  
 Untersuchungen über den Einfluss von Chemikalien und Röntgenstrahlen auf die Mitose von *Vicia Faba*. (**The effect of chemical substances and X rays on the mitosis of *V. Faba***).  
 Chromosoma, Berlin 1951 : 4 : 239-72.

A detailed comparison is set out of the differences between the effects of (i) X irradiation and (ii) ethyl urethane and various urethane-KCl and other mixtures on mitosis in *V. Faba*. The m and M chromosomes appear to differ in regard to the incidence of breaks.

In estimating the effects of mutagenic substances, cytoplasmic changes and disturbances must be noted as well as those manifested in the chromosomes.

41. MATSUURA, H.  
**Chromosome studies on *Trillium kamtschaticum* Pall. and its allies. XXIII. Certain peculiar meiotic configurations.**

Chromosoma, Berlin 1951 : 4 : 284-97.  
 Several unusual interlocking configurations observed among bivalents and trivalents of *T. Hagae* and *T. kamtschaticum* are analysed to demonstrate that the two-plane theory of interpretation (cf. *Plant Breeding Abstracts*, Vol.

XXI, Abst. 1550) is more applicable than the chiasmatype hypothesis. Data on these unusual configurations support the following possibilities: (1) reductional and equational opening out of the chromatids; (2) reductional and equational disjunctions of the paired kinetochores; (3) pairing along the whole length of the chromosomes; and (4) breakage and reunion of chromatids at the chiasma region.

42. MATSUURA, H. and KURABAYASHI, M.  
**Chromosome studies on *Trillium kamtschaticum* Pall. and its allies. XXIV. The association of kinetochores of non-homologous chromosomes at meiosis.**

Chromosoma, Berlin 1951 : 4 : 273-83.

During meiosis in pollen mother cells of *T. Hage* and *T. kamtschaticum* subjected to high temperatures at the period of late diplotene, multivalent complexes due to the association of nonhomologous kinetochores were observed. No specific attraction was found between any pairs of kinetochores; combination appeared to be entirely random, indicating that the kinetochores are all of the same structure irrespective of the chromosomes to which they belong. In translocation heterozygotes of *T. kamtschaticum*, two normal and two translocated chromosomes formed a quadruple complex in which the four nonhomologous kinetochores were associated in a passive manner. Association appears to occur at diplotene during the second stage of contraction; matrix substances accumulate round the kinetochores at this phase and fusion is facilitated. Kinetochores associations are more frequent between long chromosomes than short ones; this may be correlated with the duration of contraction during diplotene. Small chromosomes would be expected to recover from contraction sooner than long chromosomes; therefore the latter remain associated for a longer period during which fusion of kinetochores may be accomplished.

Although the association of nonhomologous kinetochores is generally random, it may be modified by unbalanced conditions within a nucleus; association was observed more frequently in the triploid *T. Hage* than in the diploid species.

43. BRYAN, J. H. D.  
**DNA-protein relations during microsporogenesis of *Tradescantia*.**

Chromosoma, Berlin 1951 : 4 : 369-92.

Cytological investigations during microsporogenesis of *T. paludosa* indicate that there is: (1)

a progressive increase in desoxyribose nucleic acid (DNA) content from tetrad formation until microspore mitosis; (2) equipartition of DNA between generative and vegetative nuclei; (3) a further increase in DNA content of the vegetative nucleus before anthesis; and (4) an initial DNA content, equivalent to that found in diploid cells, in each set of haploid chromosomes. Data concerning protein relationships suggest a similar increase in content during microsporogenesis, but the rate of synthesis appears to be more rapid and continues in the vegetative nucleus after division of the microspores.

44. MARQUARDT, H.  
**Die Wirkung der Röntgenstrahlen auf die Chiasmefrequenz in der Meiosis von *Vicia Faba*. (The effect of X rays on the chiasma frequency in meiosis of *V. Faba*).**

Chromosoma, Berlin 1951 : 4 : 232-72.

As an indirect contribution to the elucidation of the mechanism whereby chromosome breaks arise, the effect of X irradiation was studied in *V. Faba*. The results showed that a reduction in chiasma frequency accompanied the observed increase in chromosome aberrations, e.g. fragmentations, translocations and recombinations.

Possible causes of the reduction in the number of chiasmata are discussed. From the fact that the effective irradiation must precede the time when chromosome pairing and crossing-over occur, the writer infers that the change in chromosome behaviour cannot be due to direct absorption of irradiated energy, but that the irradiation appears to bring about some kind of secondary changes, possibly metabolic, which require a period of 2-3 days before they materialize and are able to influence chiasma formation.

Attention is drawn to the difference between m and M chromosomes in response to X irradiation.

45. WEBB, M.  
**The influence of magnesium on cell division. 4. The specificity of magnesium.**  
J. Gen. Microbiol. 1951 : 5 : 480-84.

Further investigations (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 127) have shown that Mn<sup>++</sup> is capable of replacing Mg<sup>++</sup> in the formation of the Gram complex and in the activation of cell division.



46. HERSKOWITZ, I. H.  
**The genetic basis of X-ray induced recessive lethal mutations.**  
 Genetics 1951 : 36 : 356-63.

Several hypotheses on the origin of X-ray-induced recessive lethals in *Drosophila* are examined. The author suggests that only a hypothesis that recognizes lethals as having three modes of origin is consistent with the experimental and theoretical data. These modes comprise: point mutation independent of breakage; breakage only; and position effect following rearrangement of breaks. A mathematical system is formulated which provides values for the frequencies of lethals originating in the three ways at different X ray doses and which is consistent with observed lethal mutation rates and numbers of surviving breaks.

47. WALLACE, B.  
**Dominant lethals and sex-linked lethals induced by nitrogen mustard.**  
 Genetics 1951 : 36 : 364-73.

The relationships between the frequency of dominant lethals and frequency of sex-linked recessive lethals induced by nitrogen mustard was found to be similar to that shown by a theoretical curve derived from data on X-ray-induced lethals. This similarity conflicts with the conclusion reached by Auerbach and Robson that nitrogen mustard induces fewer translocations than X rays. The two mutagenic agents are however regarded as being essentially alike in their primary chromosomal action; it is suggested that the low frequency of translocations produced by nitrogen mustard possibly results from subsequent complications.

48. THERMAN, E.  
**Somatic and secondary pairing in *Ornithogalum*.**  
 Hereditas 1951 : 5 : 253-69.

Studies of the chromosome behaviour of *O. graminifolium* ( $2n = 10$ ) and *O. caudatum* ( $2n = 54$ ) have revealed a tendency to somatic and secondary pairing. The interpretation of these phenomena is discussed in respect of the theory of precocity of cell conditions outside the chromosomes relative to changes within.

49. WURCELDORF-WARDEN, J. E.  
 Un caso de aberración cromosómica espontánea. (A case of spontaneous chromosome aberration).  
 Rev. Argent. Agron. 1951 : 18 : 109-10.

A chromatin bridge was observed, in the absence of fragments, in a root tip cell of a plant of

garden stocks grown from seed which had been kept over from the 1947-48 season.

50. HAGA, T.  
**(Chromosome mutation under low temperature conditions).**  
 Jap. J. Genet. 1946 : 21 : 90-91. [Japanese].

Numerous chromosome and chromatid breaks and subsequent mitotic irregularities were observed after subjecting the pollen of *Trillium kamtschaticum* to a temperature of 0° C. for 100 days.

51. D'AMATO, F.  
 Nuovi dati sull'attività mutagena dei derivati dell'acridina. (New data on the mutagenic activity of acridine derivatives).  
 Caryologia, Pisa 1950-51 : 3 : 311-26.

In continuation of previous work (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2204), investigations were made on the effects of a further 12 acridine derivatives. The results confirmed earlier observations that the substitution of  $-OCH_3$  or  $-Cl$  in the acridine molecule destroys its mutagenic effect. The most active of the compounds tested was 9-methylacridine, which was equal to acridine itself.

Pseudochiasmata were again observed in the absence of stickiness.

52. LINNERT, G.  
 Die Bestimmung des Zeitpunktes für das Auftreten von Chromosomenmutationen in der Meiosis von *Oenothera* nach experimenteller Einwirkung. (Determination of the time at which chromosome mutations occur in meiosis in *Oenothera* after experimental treatment).  
 Z. indukt. Abstamm. -u. VererbLehre 1951 : 83 : 414-21.

The course of meiosis was followed in anthers of the hybrid *Oe. (suaveolens sulfurea* x *Hookeri* Freiburg) *flavens*<sup>h</sup> *Hookeri* grown in August in the open. The stage from resting nucleus to tetrads was completed in  $4\frac{1}{2}$  days, leptotene and pachytene each taking 2 days, pachytene to telophase 12 hours, diakinesis, metaphase and second division each 4 hours. In inflorescences kept in a cool chamber at 10°C the periods were longer, the entire course requiring 11-12 days. When plants growing in the open were treated with ethylurethane, buds removed 24 hours after treatment already showed a considerable number of chromosome mutations; buds kept

at 10° showed them after 2 days. It is clear, therefore, that the effect of the treatment occurred during pachytene, diplotene or diakinesis and not in the resting nucleus; the most likely stage is thought to be pachytene, at the time of chiasma formation.

53. OEHLKERS, F. and LINNERT, G.  
Weitere Untersuchungen über die Wirkungsweise von Chemikalien bei der Auslösung von Chromosomenmutationen. (**Further investigations on the mode of action of chemicals in producing chromosome mutations**).  
Z. indukt. Abstamm.- u. VererbLehre 1951 : 83 : 429-38.

Inflorescences of two *Oenothera* hybrids were placed in solutions of various compounds to test their mutagenic effect. The most effective was morphine hydrochloride, followed by ethylurethane + KCl, X rays and then the alkaloids atropine and scopolamine. Ethylurethane alone was inactive, but combined with X rays it had the same effect as when combined with KCl. Even in those inflorescences which had been cut and placed in tap water or distilled water a slightly higher mutation percentage was observed than in plants growing in the open. The chromosome disturbances were of the same type in all treatments, the variations being purely quantitative. In treatments with ethylurethane differences between reciprocal hybrids were observed in respect of percentage of mutations, whereas in treatments with X rays, other alkaloids and  $AlCl_3$  the reciprocals were alike. This difference is thought to be a cytoplasmic rather than a nuclear effect.

54. OEHLKERS, F., LINNERT, G. and STANGE, L.  
Die Häufigkeit experimentell durch Röntgenstrahlen und Chemikalien induzierter Chromosomenumbauten auf den unterscheidbaren Anteilen der *Oenothera*-Genome in der Meiosis. (**The frequency of chromosome translocations induced experimentally by X rays and chemicals in the distinguishable portions of the *Oenothera* genomes at meiosis**).  
Z. indukt. Abstamm.- u. VererbLehre 1951 : 83 : 479-84.

A comparison of diakinesis in hybrids of *Oenothera* treated with X rays and with chemicals showed the effects of the two types of agency to be identical, both in respect of the types of

translocation and their relative frequency. This result makes it seem less probable that X rays act directly on the chromosome as assumed in the Treffer hypothesis.

55. MARQUARDT, H.  
Die Auslösung von Chromosomenmutationen durch Röntgenstrahlen und durch die Invertseife Zephirol in der Meiosis von *Oenothera Hookeri*. (**The induction of chromosome mutations by X rays and by Zephirol in the meiosis of *Oe. Hookeri***).  
Z. indukt. Abstamm.- u. VererbLehre 1951 : 83 : 513-30.

Various forms of deletion, fragmentation and translocation observed in meiotic chromosomes of *Oe. Hookeri* after treatment with the disinfectant Zephirol and with X rays are described. The frequency of aberrations after Zephirol treatment was intermediate between the controls and the X-irradiated material. The Zephirol produced more chromatid translocations and less whole-chromosome fragmentations than the X rays and caused a greater number of achromatic regions. This may mean that Zephirol acts by affecting the nucleic acid metabolism. With Zephirol there was no rise in mutation rate between the third and sixth days after application such as occurred with X rays and, in other experiments, with urethane.

56. STANGE, L.  
Untersuchungen über den Einfluss von Begleitfaktoren auf die mutationsauslösende Wirkung der Röntgenstrahlen. (**Investigations on the influence of supplementary factors on the mutagenic effect of X rays**).  
Z. indukt. Abstamm.- u. VererbLehre 1951 : 83 : 485-512.

The frequency of chromosome fragmentations, translocations and other irregularities in *Oenothera* hybrids after various X ray doses was examined. The frequency of translocations fitted well to a 2-hit curve, that of fragmentations to a single-hit curve. These results were compared with those obtained after standing the inflorescences in solutions of various salts 24 hours before irradiation. None of the salts used increased the mutation rate when applied without irradiation, except KSCN, which had a significant mutagenic effect. Significant increases in the mutation frequency after X ray treatment were observed from LiCl and KSCN and an almost significant effect from KCl. No increase was detectable from  $CaCl_2$ ,  $MgCl_2$  or



$K_2SO_4$ . It is pointed out that both LiCl and KCl cause the chromosomes to swell.

The experiments were carried out at two temperatures, 10° and 20° C, during the entire treatment. At the higher temperature there was a relatively smaller number of translocations and higher number of fragmentations.

57. TARABUSI, T.

Rotture cromosomiche indotte dagli  $\alpha$ -alogeno derivati del naftalene e dalla  $\beta$ -naftochinolina. (**Chromosome breaks induced by  $\alpha$ -halogen derivatives of naphthalene and by  $\beta$ -naphthoquinoline**).

Caryologia, Pisa 1950-51 : 3 : 370-80.

C-mitoses were observed in *Allium Cepa* roots after treatment with  $\alpha$ -chloronaphthalene. Many aberrant anaphases were also observed, with frequent occurrence of double fragments, indicating that the irregularities had arisen in the interkinetic nucleus before the chromosomes had split.

Similar effects were observed from  $\alpha$ -bromonaphthalene and more still from  $\alpha$ -fluoronaphthalene whilst the corresponding iodine derivative was less effective. The most active of all was  $\beta$ -naphthoquinoline, which had a marked toxic effect and caused extreme chromosome stickiness. The view is expressed that all compounds which exert a c-mitotic effect will also prove mutagenic if applied in suitable concentrations.

58. LEVITAN, M.

**Experiments on chromosomal variability in *Drosophila robusta*.**

Genetics 1951 : 36 : 285-305.

In a study of natural and artificial populations, chromosomal inversions were found to be subject to natural selection, inversion heterozygotes possessing higher adaptive values than homozygotes.

59. NOVITSKI, E.

**Non-random disjunction in *Drosophila*.**

Genetics 1951 : 36 : 267-80.

The frequency of recovery of ring chromosomes from attached X chromosomes heterozygous for an inversion was inconsistent with the expectations based on tetrad analysis; the cause appeared to be nonrandom disjunction at the second meiotic division when two structurally dissimilar chromatids competed for inclusion in the functional egg nucleus.

60. D'AMATO, F.

Sull'attività mutagena dell'acenaftene. (**On the mutagenic action of acenaphthene**).

Nuovo G. Bot. Ital. 1948 : 55 : 323-24.

Acenaphthene brings about chromosome fragmentation during the resting stage and chromosome breakage near the centromere at metaphase.

61. LEWIS, H.

**The origin of supernumerary chromosomes in natural populations of *Clarkia elegans*.**

Evolution, Lancaster, Pa 1951 : 5 : 142-57.

The occurrence of supernumerary chromosomes in natural populations of *C. elegans* in coastal California has been surveyed. About 20% of the plants sampled possessed from 1 to 6 supernumeraries. The supernumeraries could not be distinguished from chromosomes of the normal complement by staining or meiotic behaviour. Not all of the supernumeraries were homologous. In the course of the survey it was also discovered that heterozygotes for structural chromosomal differences also occurred in 25% of the plants examined; as a result of observations on meiotic configurations, one primary chromosomal arrangement and seven derived genomes are postulated. It is suggested that the supernumeraries in *Clarkia* and *Godetia* have originated as a result of structural rearrangement and subsequent meiotic irregularity, and are duplicates of chromosomes constituting the basic set. The possible evolutionary role of supernumeraries is examined.

62. CLELAND, R. E.

**Extra, diminutive chromosomes in *Oenothera*.**

Evolution, Lancaster, Pa 1951 : 5 : 165-76.

Races mono and Mataquey of *Oe. Hookeri*, found widely separated in California, are characterized by two extra diminutive chromosomes for which they tend to breed true. These chromosomes do not differ in behaviour, or apart from their size, morphologically from the normal chromosomes. They pair with each other in meiosis and disjoin normally. They have never been found in association with the normal chromosomes; therefore their pairing ends are not homologous with any of the 14 pairing ends in the ordinary chromosomes. In hybrids resulting from outcrossing, the diminutives exhibit a tendency to multiply; over half

of the  $F_1$  plants examined possessed 2 or 3 extra chromosomes instead of the single one expected; probably nondisjunction during somatic mitosis in the  $F_1$  hybrids is responsible. The extra diminutives exert no noticeable effect upon the phenotype. They may have originated by a process of fragmentation, or have been introduced as a result of hybridization with another subgenus; some subgenera have smaller chromosomes than *Euoenothea*.

63. NISHIYAMA, I.  
(Theoretical genetic segregations in autotetraploids).  
Jap. J. Genet. 1946 : 21 : 87-90. [Japanese].

Tables are given showing the modes of  $F_2$  segregation to be expected in diploids, tetraploids, hexaploids, octoploids and decaploids when 1, 2, 3, 4, 5, 6 or  $m$  allelomorphic gene sets are being considered.

64. WIERSEMA, H. T.  
De betekenis van de erfelijkheid bij autotetraploiden voor de plantenveredeling, in het bijzonder voor de aardappelcultuur. (The significance of heredity in autotetraploids for plant breeding, especially for potatoes).  
Studiekring voor Plantenveredeling (Plant Breeding Study Circle) 15 July, 1947 Wageningen 150-53. (Mimeographed).

In recent years many means of inducing polyploidy have been discovered. Plants treated with colchicine often show reduced height; thickenings occur frequently and lenticels and pollen grains are frequently larger than normal. Treated parts are often overgrown by normal tissue; sectorial and periclinal chimeras occur. Crossing the homozygous dominant ( $A_4$ ) with the recessive tetraploid ( $a_4$ ) gives in the  $F_2$  with allopolyploids a segregation ratio of 1 : 4 : 6 : 4 : 1, and with autopolyploids a ratio of 1 : 8 : 18 : 8 : 1 for the classes  $A_1$ ,  $A_3a$ ,  $A_2a_2$ ,  $Aa_3$  and  $a_4$  respectively. Homozygous dominants are much more difficult to get from tetraploids than from diploids. *Solanum tuberosum*, which has 48 chromosomes, is thought to be tetraploid. Lunden has found that most characters occur in the simplex condition, with a few in the duplex condition.

In the discussion, in reply to the question why  $x = 6$  is often taken now as the basic number of the potato, the reply was, because crossing plants with 24 and 48 chromosomes gives fertile crosses.

Potato viruses A and X were stated to be closely associated and resistance to X often provides resistance to A, e.g. in the variety Albion. Association has also been observed between resistance to *Phytophthora* and scab, according to Bakker.

65. D'AMATO, F. and AVANZI, M. G.  
Reazioni di natura auxinica ed effetti rizogeni in *Allium Cepa*. (Reactions producing growth responses and the induction of root formation in *A. Cepa*).  
Nuovo G. Bot. Ital. 1948 : 55 : 161-213.

The effects of water vapour, chloroform vapour and p-dichlorobenzene vapour, NaCl, KCl,  $Ca(NO_3)_2$ , chloroform, nicotinic acid, nicotinic acid amide, Thiogamma, Thiazene, p-aminobenzoic acid and two of its derivatives, 2,4-dichlorophenoxyacetic acid and its sodium salt, and colchicine, and of decapitation on the growth and cell division of onion roots are recorded. The c-mitotic effects induced by some of the reagents are described and compared.

66. NAUNDORF, G.  
La producción química de nuevas variedades de plantas. (The chemical production of new plant varieties).  
Acta Agron., Palmira 1950 : 1 : 27-48.

A review is given, for the benefit of Spanish readers, of the published work on the use of colchicine, acenaphthene, morphine, hormones and other chemical substances in the production of polyploid plants; the methods of application are described and a list is given of some of the species which have been successfully treated. The article ends with a selected bibliography.

67. SOEDA, T.  
[The effect of some chemicals in inducing polyploidy (preliminary report)].  
Jap. J. Genet. 1946 : 21 : 44-45. [Japanese].

The effects of camphor and ethyl mercuric chloride in inducing polyploidy in higher plants are noted.

68. NICOL, H.  
Mr. László J. Havas.  
Nature, Lond. 1951 : 168 : p. 16.

A short obituary account of the work of L. J. Havas refers to his pioneer investigations on the effects of colchicine upon cell division.



69. HIRAWOKA, H.  
[The effect of various chemical substances on radish seedlings (preliminary report)].  
Jap. J. Genet. 1946 : 21 : 45-46. [Japanese].

Increased stomatal dimensions have been observed in seedlings of *Raphanus sativus*, following treatment with chloral hydrate, cocaine, naphthalene or sodium cacodylate. These substances therefore may be of interest for inducing polyploidy.

70. CHURÝ, J. and SLOUKA, V.  
Vliv bromu na mitosu v kořenových vrcholech *Allium cepa*. (The effect of bromine on mitosis in root tips of *A. Cepa*).  
Publ. Fac. Méd. Brno 1948 : 22 (13) : 1-12.

Bromine vapour brings about pathological changes in the nuclei of *A. Cepa*. The effects noted include pseudometaphases and polyploidy.

#### \*BOTANY

71. HAECKEL, A.  
Beitrag zur Kenntnis der Pollenfermente. (A contribution to the study of pollen enzymes).  
Planta 1951 : 39 : 431-59.

In the course of this study on phosphatase, amylase and invertase activity in the pollen of numerous plant species it was found that: (1) there were differences in the enzyme activity of pollen from species of the same genus and also within species; (2) no correlation existed between enzyme activity and rate of pollen tube growth or the length of style, though enzyme activity did appear to be related to the structure of the style, plants with a styler canal showing high amylase or invertase activity, and plants with conducting tissue in the style, high phosphatase activity.

72. BALLATORE, P.  
Primi risultati di alcune prove di orientamento sulla jarovizzazione della fava da granella. (Preliminary results of some pilot experiments on vernalization of broad bean).  
Ann. Fac. Sci. Agr. Univ. Palermo 1950 : 1 : 181-98.

- ZANINI, E.  
Risultati, interpretazioni e prospettive della "jarovizzazione." (Results, interpretations and prospects of vernalization).  
Ibid. 1950 : 1 : 342-44.

Positive results were obtained with cold treatment in Fexala cotton and broad bean, whereas several winter wheats matured when sown in Sicily on 24 March, without any cold period at all. Vernalization effects are considered to be the result of the stimulating effect of the cold rather than phasic development and it is thought highly improbable that the effects should be inherited.

73. †ARTS, T. J. A.  
De moeilijkheden bij het vaststellen van de minimum-afstand om kruisbestuiving te voorkomen. (The difficulties in determining the minimum distance for preventing cross-pollination).  
Studiekring voor Plantenveredeling (Plant Breeding Study Circle) 18 December 1947 Wageningen 182-89. (Mimeographed).

As it is impossible to prevent cross pollination entirely by spatial isolation, the question arises as to what percentage of hybrids is permissible. The extent of cross pollination in various self pollinating economic plants and the ways in which hybridization may be brought about, and also prevented, were the main subjects of this lecture.

74. ERNST, A.  
Die Nachkommenschaften aus Kreuzungen zwischen dimorphen und monomorphen *Primula*-Arten der Sektion *Candelabra*. (The progenies from crosses between dimorphic and monomorphic *Primula* species of the section *Candelabra*).  
Arch. Klaus-Stift. VererbForsch. 1943 : 18 : 87-233.

The fundamental problem underlying this research is the origin of heterostyly in *Primula*. The investigations in this paper comprise: (1) the distribution of monomorphism of the flowers in the genus *Primula*; and (2) intra-specific and interspecific pollinations on, and with, long and short styled plants of the dimorphic species *P. pulverulenta* and the

\* General studies, see also individual crops.

† An extended summary of this paper is on file at the Bureau.

monomorphic species *P. Cockburniana* and *P. chungensis*. In the discussion of the results the need is pointed out for a restatement of Darwin's "legitimacy rule" so as to extend its application. A working hypothesis is advanced to the effect that the initial form from which heterostylous plants have been derived is a monomorphic self fertile form with a long style, highly placed anthers and large pollen grains; this hypothesis has been supported by the discovery amongst Asiatic primulas of a frequently occurring form with these characteristics.

The inheritance of heterostyly, in  $F_1$  hybrids from crosses between monomorphic and dimorphic *Primula* species of the section *Candelabra* is discussed, and the three types of gametes which result from interspecific pollinations are set out, arranged in order of dominance of the characters they condition.

75. LÖVE, Á.  
**Taxonomical evaluation of polyploids.**  
Caryologia, Pisa 1950-51 : 3 : 263-84.

Reports of "intraspecific chromosome races" by cytologists are criticized. It is pointed out that over 90% of the polyploid types occurring in northern Europe have been previously described by classical taxonomists, and that polyploid types completely indistinguishable on a morphological basis are unknown, at least in north-western Europe. Thirty examples are cited in detail to support the contention that taxonomists have recognized so-called intra-specific chromosome races as distinct species. With the exception of asexually reproducing hybrids having an odd multiple of the basic chromosome number, the classification of all polyploid types as distinct species is advocated.

#### \*DISEASES, INJURIES, BACTERIA, FUNGI, VIRUSES

76. KELNER, A.  
**Studies on the genetics of antibiotic formation: the induction of antibiotic-forming mutants in actinomycetes.**  
J. Bact. 1949 : 57 : 73-92.

By means of irradiation with X rays and ultraviolet light, mutations were induced in several strains of *Streptomyces*. The mutants

showed antibiotic reactions towards bacteria against which the parent cultures were inactive.

77. SAVAGE, G. M.  
**Improvement in streptomycin-producing strains of *Streptomyces griseus* by ultraviolet and X-ray energy.**  
J. Bact. 1949 : 57 : 429-41.

X rays are more mutagenic than ultraviolet radiation with respect to *S. griseus* RCC 3496. Strains of superior streptomycin yielding capacity, produced by X rays, proved to be extremely unstable.

78. KELNER, A.  
**Mutation in *Streptomyces flaveolus* induced by X-rays and ultraviolet light.**  
J. Bact. 1948 : 56 : 457-65.

The quantitative effects of irradiation by ultraviolet doses up to 20,000 ergs. x mm.<sup>-2</sup> and X rays up to 300,000 r. with respect to frequency of mutation in gross morphology were investigated at Cold Spring Harbor, New York, using *S. flaveolus* ATCC 3319. The most common mutant types were a yellow pigmented form, an asporogenous strain in which aerial spores were absent and a restricted mutant growing sparsely on asparagine-glucose agar.

It is supposed that the yellow mutant resembles an ancestral form of *S. flaveolus*, as it corresponds more closely to Bergey's description in 1939 than does ATCC 3319. The possibility of determining ancestral strains of cultures suspected of having undergone natural variation is emphasized. Similarly, close relationships hitherto unsuspected may be disclosed, forming additional bases for taxonomic work.

Although ultraviolet irradiation caused an increased mutation frequency with increasing dosage, reaching 24% in one experiment, its results were less uniform than those produced by X rays; the latter rays are therefore preferred for inducing mutation in Actinomycetes.

79. WYSS, O. and  
WYSS, M. B.  
**Mutants of *Azotobacter* that do not fix nitrogen.**  
J. Bact. 1950 : 59 : 287-91.

Stable mutants of *A. vinelandii*, incapable of fixing nitrogen, have been obtained from cultures irradiated with ultraviolet light and subcultured in an atmosphere of hydrogen.



80. BURTON, M. O. and  
LOCHHEAD, A. G.  
**Studies on the production of vitamin B<sub>12</sub>-active substances by micro-organisms.**  
Canad. J. Bot. 1951 : 29 : 352-59.

A culture of *Nocardia* strain SS 112, subjected to ultraviolet irradiation, produced from 45 to 360 m $\mu$  grm. of vitamin B<sub>12</sub> per ml. compared with 80 to 100 m $\mu$  grm. per ml. obtained from nonirradiated colonies. Statistical analysis of the data, however, shows subsequent variability in the vitamin producing capacity of the irradiated strain, which precludes assumption that a mutation had occurred.

81. KELNER, A.  
**Photoreactivation of ultraviolet-irradiated *Escherichia coli*, with special reference to the dose-reduction principle and to ultraviolet-induced mutation.**  
J. Bact. 1949 : 58 : 511-22.

Data are presented concerning the light induced recovery of *E. coli* from otherwise lethal injuries caused by ultraviolet irradiation. The results indicate that reactivating light reduced the frequency of zero point mutants, characterized by phenotypic expression within a few minutes of irradiation, but had little effect on delayed mutations.

82. NEWCOMBE, H. B. and  
WHITEHEAD, H. A.  
**Photoreversal of ultraviolet-induced mutagenic and lethal effects in *Escherichia coli*.**  
J. Bact. 1951 : 61 : 243-51.

Data are presented concerning mutations to streptomycin dependence or resistance and changed colour response on mannitol tetrazolium agar in strain B/r of *E. coli*. Both lethal and mutagenic effects of irradiation with 2537 Å ultraviolet light are influenced by posttreatment with visible light of 3650 and 3663 Å. Following low doses of ultraviolet, posttreatment with light reduced the proportion of mutations to less than 10%; lethal effects were also reduced. High doses of ultraviolet light induced a more stable mutagenic effect and only the lethal effect was reversed.

It is suggested that photosensitive and photostable mutagen poisons are formed within a cell by the ultraviolet light. High doses produce sufficient photostable substance to saturate the reaction by which mutations are caused, so that there can be no photoreversal of the mutagenic effect.

83. CLARK, J. B.,  
HASS, F.,  
STONE, W. S. and  
WYSS, O.  
**The stimulation of gene recombination in *Escherichia coli*.**  
J. Bact. 1950 : 59 : 375-79.

The rate of formation of prototrophs in a mixture of the mutant strains, Y-53 and 58-161, of *E. coli* K-12, was increased by direct ultraviolet irradiation of the cells, irradiating the substrate, or adding hydrogen peroxide or sodium azide to the cultural medium. An increase in the back mutation rate, to account for the observed rate of prototroph formation, was suspected. Therefore the individual strains were subjected to treatments similar to those inducing formation of prototrophs, but in no case was any back mutation observed. Thus it was assumed that an increase in the degree of genetic recombination had occurred.

84. MEFFERD, R. B. (JUN.) and  
WYSS, O.  
**The mutability of *Bacillus anthracis* spores during germination.**  
J. Bact. 1951 : 61 : 357-64.

Data are presented on the mutagenic and lethal effects of ultraviolet irradiation during various stages of germination. The rate of incidence of induced streptomycin resistant mutations was low in resting spores but increased rapidly during germination. Spores allowed to germinate only 5 min. before exposure to ultraviolet light showed a marked increase in mutability. Some delayed mutants appeared from irradiation at all stages of germination.

85. HILLIER, J.,  
MUDD, S.,  
SMITH, A. G. and  
BEUTNER, E. H.  
**The "fixation" of electron microscopic specimens by the electron beam.**  
J. Bact. 1950 : 60 : 641-54.

Although the pattern of contrast between nuclei and cytoplasm in electron micrographs of young cells of *Escherichia coli* fixed in osmic vapour (cf. Abst. 121) resembles the visual appearance observed with light and phase contrast microscopes, specimens subjected to electron microscopy become chemically altered so that they are able to withstand the high effects of temperatures and normal hydrochloric acid. This apparent "fixation" by electron irradiation has been attributed to a fundamental interaction between the bombarding electrons

and the tissue of the specimen, probably being the result of energy imparted to each molecule by the electrons.

86. FRAM, H.,  
PROCTOR, B. E. and  
DUNN, C. G.  
**Effects of X-rays produced at 50 kilovolts on different species of bacteria.**

J. Bact. 1950 : 60 : 263-67.

An investigation of the effects of X-rays of up to 50 kv. on *Escherichia coli*, *Aerobacter aerogenes*, *Staphylococcus aureus*, *Serratia marcescens*, *Pseudomonas aeruginosa* and *P. fluorescens* has shown that the percentage of bacteria of a given species killed by a specific dose was the same regardless of the density of the population irradiated. Straight line survival curves support the direct hit theory of radiation.

87. PLOUGH, H. H.,  
YOUNG, H. N. and  
GRIMM, M. R.  
**Penicillin-screened auxotrophic mutations in *Salmonella typhimurium* and their relation to X ray dosage.**

J. Bact. 1950 : 60 : 145-87.

The frequency of mutations occurring in strains of *S. typhimurium*, after exposure to X rays of up to 57,000 r. followed by screening with penicillin on a minimal medium, is directly related to the X ray dosage. It is therefore suggested that the auxotrophic mutant strains, having a constant requirement for one or more substances which the parent strain can synthesize, have arisen by gene mutations similar to those found in higher organisms.

88. KARLSSON, J. L. and  
BARKER, H. A.  
**Induced biochemical mutants of *Azotobacter agilis*.**

J. Bact. 1948 : 56 : 671-77.

Several X-ray-induced mutants of *A. agilis*, showing morphological and physiological variations, have been obtained at the University of California. Particular reference is made to a stable variant unable to convert pyruvate to acetate.

89. TEAS, H. J.  
**Mutants of *Bacillus subtilis* that require threonine or threonine plus methionine.**

J. Bact. 1950 : 59 : 93-104.

A study of the nutritional requirements of 12 mutant forms of *B. subtilis* revealed that 7

needed threonine while the remaining 5 required threonine plus methionine. One of the mutants requiring the two substances for growth showed a reverse mutation to the original wild type after subjection to X rays of 90,000 to 100,000 r.; thus it appears that the double requirement was due to a single mutation only.

90. DOBSON, R. L.  
**Lethal radiation effects of X-rays, deuterons, and alpha particles on the bacterium *Escherichia coli*.**

US Atom. Energy Comm. 1951 : UCRL-1140 : Pp. 4. [from : Nuclear Sci. Absts. 1951 : 5 : Abst. 3299].

*E. coli* strain B and its radiation resistant mutant B/r were irradiated in air with X rays, deuterons and  $\alpha$  particles. Typical exponential survival curves were secured; thus in this respect the bacteria behaved as would be expected according to a simple target theory. B/r was in all cases more resistant than B. Contrary to expectations based on the target theory both strains were killed more efficiently by low energy deuterons and  $\alpha$  particles than by high energy deuterons and  $\alpha$  particles. Survival was increased when irradiation occurred in the presence of N<sub>2</sub> or argon. A modified target hypothesis is proposed. The target, it is suggested, may be inactivated not only by an ionization within its volume but also by energy transferred from the track of the ionizing particle through a finite distance in the cell; the probability that the latter mechanism results in target inactivation at a given distance increases with the ion density along the track.

91. DAVIS, B. D.  
**Nonfiltrability of the agents of genetic recombination in *Escherichia coli*.**

J. Bact. 1950 : 60 : 507-08.

The results of further tests concerning the ability of agents causing genetic recombination in *E. coli* to pass through a filter of fritted glass have indicated that recombination is not dependent on a filterable substance unless that substance is exceedingly unstable.

92. LEDERBERG, J.  
**Prevalence of *Escherichia coli* strains exhibiting genetic recombination.**

Science 1951 : 114 : 68-69.

A screening procedure is described by means of which it has been demonstrated that genetic recombination occurs not only in mixed cultures involving strain K 12 (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 134 and Vol. XXII,



Abst. 137) but also in mixtures of other auxotrophic mutant strains.

93. ZELLE, M. R. and LEDERBERG, J.  
**Single-cell isolations of diploid heterozygous *Escherichia coli*.**  
J. Bact. 1951 : 61 : 351-55.

The results of investigations of four different single cell cultures of *E. coli*, with particular reference to the occurrence of segregation in their pedigrees, confirm the appearance within a single cell of genetically controlled characteristics originally possessed by two parent forms and subsequent separation of these characters. Thus, the sexual basis of genetic recombination is further illustrated.

94. BRUNER, D. W.  
**The transformation of *Salmonella oranienburg* to *Salmonella montivideo*.**  
J. Bact. 1949 : 57 : 387-88.

In a medium containing adsorbed *S. oranienburg* antiserum, a culture of *S. oranienburg* produced sectors from which a form indistinguishable from *S. montivideo* was isolated. During the transformation, antigen t disappeared, antigens g and s were developed and antigen m was retained in a recognizable form.

95. DE LA GAZA CURCHO, M.  
**Mutation to tryptophan independence in *Eberthella typhosa*.**  
J. Bact. 1948 : 56 : 374-75.

Data are presented concerning the rate of spontaneous mutations by which *E. typhosa*, strain O 901, gradually becomes tryptophane independent when transferred to media containing diminishing concentrations of the amino acid.

96. JAMES, A. P.  
**The development of tyrosine-independent strains of *Lactobacillus arabinosus*.**  
J. Bact. 1951 : 60 : 719-31.

Although the estimated time necessary for a tyrosine independent mutant of *L. arabinosus* to establish itself sufficiently to cause visible turbidity in a tyrosine deficient medium is less than 40 hours, a delay of 1-6 days has been observed between inoculation with normal *L. arabinosus* and the first appearance of tyrosine independent mutants. This delay is due to a preliminary inhibition of mutant cells by the parent culture. Evidence is presented in the form of growth curves to show that successive mutations occur; it is by these that the inhibition is finally overcome.

Diseases, Injuries, Bacteria, Fungi, Viruses *continued*.

97. ENGBERG, E. and STANIER, R. Y.  
**The relationship between growth and mutation in *Pseudomonas fluorescens*.**  
J. Bact., 1949 : 58 : 171-80.

A technique for measuring the rate of spontaneous mutation in *P. fluorescens* is described; it is based on limited invisible growth of the original strain in a medium devoid of carbon substrate. A high positive correlation between such growth and the occurrence of spontaneous mutants, able to utilize a carbon substrate of which the parent form cannot make use, has been demonstrated by culturing in media to which varying concentrations of a single carbon compound had been added; the mutant population appears as a visible turbidity.

98. DAVIS, B. D. and MINGIOLI, E. S.  
**Mutants of *Escherichia coli* requiring methionine or vitamin B<sub>12</sub>.**  
J. Bact. 1950 : 60 : 17-27.

A number of mutants of *E. coli* requiring either vitamin B<sub>12</sub> or methionine have been isolated; they do not respond to homocysteine, the immediate precursor of methionine. Other mutants which respond to homocysteine do not require B<sub>12</sub>.

99. RYAN, F. J. and SCHNEIDER, L. K.  
**The consequences of mutation during the growth of biochemical mutants of *Escherichia coli*. I. The pattern of adaptation of histidineless cultures.**  
J. Bact. 1948 : 56 : 699-708.

Histidine independent mutants have been observed in a population of *E. coli* which requires histidine for growth. The extent of growth of mutants in the absence of histidine, termed adaptation, is inversely proportional to the histidine content of the medium. As the histidine concentration increases, the number of histidine-requiring bacteria also increases while the adaptive growth rate of histidine independent mutants becomes depressed.

100. MARSHAK, A.  
**Differences in response of a virulent strain of the tubercle bacillus and its avirulent variant to metabolites and their genetic significance.**  
J. Bact. 1951 : 61 : 1-16.

Observations indicate that H37 Ra differs from the virulent strain, H37 Rv, by having lost the

capacity to utilize phospholipides. Evidence is presented to show that a single gene mutation may determine this difference.

101. YEGIAN, D. and  
VANDERLINDE, R. J.  
**The biological characteristics of streptomycin-dependent *Mycobacterium ranae*.**

J. Bact. 1949 : 57 : 169-78.

A streptomycin dependent variant, B<sub>1</sub>, has been isolated from a streptomycin resistant population of *M. ranae*. Occasional reverse mutation to the parent type of cell was observed in cultures of the streptomycin dependent strain.

102. HOERLEIN, B. F.  
**The inhibiting effect of normal serum and its gamma globulin fraction upon the variation of *Staphylococcus aureus*.**

J. Bact. 1948 : 56 : 139-40.

Further studies on the establishment of non-smooth *S. aureus* variants by a selective effect of the environment have confirmed the specific inhibiting function of the  $\gamma$ -globulin fraction from normal serum with respect to such variation.

103. WAKSMAN, S. A.,  
REILLY, H. C. and  
HARRIS, D. A.  
***Streptomyces griseus* (Krainsky) Waksman and Henrici.**

J. Bact. 1948 : 56 : 259-69.

A wide range of variability, with respect to the ability to produce antibiotic substances, has been recorded in numerous strains of *S. griseus*. Streptomycin-producing cultures have given rise to numerous mutants, which differ in their capacity to form streptomycin under specific cultural conditions.

104. COLE, L. J. and  
BRAUN, W.  
**The effect of ionic Mn and Mg on the variation of *Brucella abortus*.**

J. Bact. 1950 : 60 : 283-89.

Experimental results suggest that the concentration of ionic Mn or Mg in the cultural medium of a smooth population of *B. abortus* determines the rate at which spontaneously occurring rough mutants become established. Addition of Mn or Mg ions produces a selective effect in favour of the rough mutants. When sodium pyrophosphate is added, these mutants are suppressed, as metal complexes are formed with the Mn and Mg ions. It is conceivable that Mn

and Mg activate enzymatic reactions involved in the production of alanine, which creates conditions favourable for the nonsmooth variants (cf. Abst. 105).

105. GOODLOW, R. J.,  
MIKA, L. A. and  
BRAUN, W.  
**The effect of metabolites upon growth and variation of *Brucella abortus*.**

J. Bact. 1950 : 60 : 291-300.

An accumulation of alanine as a metabolite of smooth cells creates an environment favourable for the establishment of spontaneously occurring rough variants. The relationship of this selective effect to population dynamics is discussed.

106. GUTHRIE, R.  
**Studies of a purine-requiring mutant strain of *Escherichia coli*.**

J. Bact. 1949 : 57 : 39-46.

The characteristics of a purine-requiring mutant of *E. coli*, 9661-01, isolated after ultraviolet irradiation, are described. Although little difficulty was found in maintaining the strain, reversion to purine independence occurred at a frequency of  $10^{-8}$ ; the rate of reversion was inversely related to the concentration of purine.

107. WITKIN, E. M. and  
KENNEDY, F. L.  
**A suppressor mutation in *Escherichia coli*.**

Amer. Nat. 1951 : 85 : 141-42.

A diauxotrophic strain, M2, requiring histidine and serine or glycine, was obtained by ultraviolet irradiation. These growth factor requirements were acquired separately and serially, presumably by two mutational steps. When the strain was plated in a minimal medium supplemented with histidine or with serine, prototrophs occurred, in addition to the expected single reversions; the frequency of double reversion was found to be approximately equal to the frequency of single reversion from either of the separate requirements. When treated with ultraviolet light the prototroph strain M2P gave rise to some mutants with the double requirement. It was therefore concluded that prototrophs occurring in strain M2 owe their wild phenotype to the action of a suppressor mutation, reversible by ultraviolet irradiation and capable of overcoming two independent metabolic blocks. Possible explanations of the biochemical basis of this phenomenon are suggested.



108. ANDERSON, E. H.  
**The effect of oxygen on mutation induction by X-rays.**  
 Proc. Nat. Acad. Sci., Wash. 1951 : 37 : 340-49.

Experiments were carried out on the effect of high oxygen tension on the induction of back mutations in a streptomycin dependent strain and a purine dependent strain of *Escherichia coli* by X rays. The sensitivity of both strains to the lethal effects of X rays was markedly increased by the presence of oxygen during irradiation. The back mutation rate of cells exposed to X rays in the presence of oxygen was greatly increased in the purine dependent strain but was only slightly increased in the streptomycin dependent strain. Similar processes therefore appear to be involved in the lethal and specific genetic effects of X rays upon the purine dependent strain but different ones in the case of the streptomycin dependent strain. The data suggest that back mutation of the streptomycin dependent strain is the result of a single ionization; back mutation in the purine dependent strain, however, appears to have a more complex origin.

109. ROGOSA, M. and MITCHELL, J. A.  
**Induced colonial variation of a total population among certain lacto-bacilli.**  
 J. Bact. 1950 : 59 : 303-08.

Data are given concerning the effects of sorbitan monooleate on rough strains of *Lactobacillus helveticus*, *L. acidophilus* and *L. brevis*; colonial morphology was altered to a completely smooth configuration. As the change is not permanent and can be reversed by varying the nutritional medium it is assumed that, in contrast with the conclusions of Braun (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2387), no mutations are involved.

110. LAMANNA, C. and MALLETTE, M. F.  
**The relation of the gram stain to the cell wall and the ribonucleic acid content of the cell.**  
 J. Bact. 1950 : 60 : 499-505.

By combining the gram stain with the cell wall staining technique of Dyar, involving cetyl pyridinium chloride and Congo red, it has been shown that part of the ribonucleic acid content of *Bacillus cereus* and *Clostridium botulinum* is located in the cell walls of vegetative cells. The cell walls of bacterial endospores and yeast ascospores are free of gram staining substances.

It has been possible to extract ribonucleic acid from yeast cells which show a gram positive reaction; after extraction the intensity of the stain is unchanged. This indicates that some ribonucleic acid within the cell is not associated with the gram reaction. The existence of more than one form of the acid is suggested.

111. MUDD, S., SMITH, A. G., HILLIER, J. and BEUTNER, E. H.  
**Electron and light microscopic studies of bacterial nuclei. III. The nuclear sites in metal-shadowed cells of *Escherichia coli*.**  
 J. Bact. 1950 : 60 : 635-39.

Electron micrographs of young cells of *E. coli*, fixed in osmic acid vapour and shadowed with chromium, represent the nuclei as irregularly shaped regions less able to scatter electrons than the surrounding cytoplasm, or as depressions over which the cytoplasm has collapsed. These observations confirm former results suggesting that the cytoplasm has a greater density than the nuclei.

112. VISCONTI DI MODRONE BORCHI, L. and VISCONTI DI MODRONE, N.  
 Analisi citologica di batteri nelle varie fasi di accrescimento. (**Cytological analysis of bacteria at various phases of growth**).  
 Chromosoma, Berlin, 1951 : 4 : 393-403.

During the resting stage, no local distinction between chromatinic material and cytoplasm is evident in *Escherichia coli*, but during growth and cell division, chromatinic masses become differentiated from the cytoplasm and from each other. These masses may possibly be equated with chromosomes.

113. STEMPEM, H.  
**Demonstration of the chromatinic bodies of *Escherichia coli* and *Proteus vulgaris* with the aid of the phase contrast microscope.**  
 J. Bact. 1950 : 60 : 81-87.

Dark phase contrast microscopy has revealed the chromatinic bodies of young living cells of *E. coli* and *P. vulgaris* as light areas which are distinct from the darker cytoplasm in the late lag and logarithmic phases. During later stages the differentiation is indistinct and the cells appear homogeneous.

Although the details in the division of chromatinic bodies were not clearly observable, it was noted that cell division occurred only

after two chromatinic bodies had developed in each cell; one passed to each of the daughter cells.

114. BAILEY, N. T. J.  
**New estimates of some recombination fractions in *Escherichia coli*, allowing for the influence of differential viability.**

Heredity 1951 : 5 : 289-92.

The approximate chromosome map of strain K-12 of *E. coli* devised by Lederberg (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 761) has been reassessed making allowance for the differential viability effects observed by Bailey (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2384).

115. DELAMATER, E. D.  
**Evidence of the occurrence of true mitosis in bacteria.**

Science 1951 : 113 : p. 477. (Abst.).

By using chemical dehydrating agents which remain liquid at low temperatures, it is possible to remove water from cells at  $-50^{\circ}\text{C}$ . By means of this method of dehydration, detailed evidence of typical mitosis in several representative forms of bacteria has been secured.

116. JORDAN, D. C. and  
GARRARD, E. H.  
**Studies on the legume root nodule bacteria. I. Detection of effective and ineffective strains.**

Canad. J. Bot. 1951 : 29 : 360-72.

During a study of differences in the action of root nodule bacteria towards varieties of legumes grown in Ontario, bacterial strains showing ineffectiveness or a symbiotic or parasitic reaction were distinguished by using the Virtanen technique. The significance of bacterial types found in effective and parasitic nodules is not known but it is thought that morphological changes may be induced by alterations in the carbohydrate synthesis of the host. Hypotheses to account for the origin of parasitic and ineffective bacteria in the soil include the occurrence of normal mutations followed by environmental selection and the induction of mutations by mutagenic agents of an unspecified nature.

117. STONE, J. L.  
**Attempt to show diffusion of essential growth factors from an induced penicillin-resistant culture to the parent penicillin-sensitive strain.**

Science 1951 : 113 : 493-94.

A penicillin resistant strain of *Staphylococcus*

*aureus* was obtained from a sensitive strain by an appropriate cultural method. No essential nutrient was supplied by diffusion to enable the sensitive strain to reproduce when adjacent to the resistant strain. Possibly (1) penicillin impairs the ability of the sensitive culture to assimilate an essential nutrient from the medium, whereas the resistant strain is able to synthesize the substance within the cell, as suggested by Gale and Rodwell; or (2) other processes are concerned, e.g. the acquired ability of the resistant mutant to grow in the absence of an essential factor without synthesizing this substance.

118. KLEIN, H. P. and  
DOUDOROFF, M.  
**The mutation of *Pseudomonas putrefaciens* to glucose utilization and the enzymatic basis.**

J. Bact. 1950 : 59 : 739-50.

A mutant of *P. putrefaciens* has been isolated which differs phenotypically from the wild type in its ability to utilize glucose. The enzymatic basis of this characteristic depends on the production of a glucose specific hexokinase in the presence of glucose, which the wild type cannot produce. Like the wild type, the mutant form possesses enzymes necessary for subsequent metabolism. Attempts to select for mutants able to utilize fructose were unsuccessful.

119. ZELLE, M. R.  
**A simple single-cell technique for genetic studies of bacteria.**

J. Bact. 1951 : 61 : 345-49.

The method described is useful not only for isolating large numbers of single cell cultures with known relationships but also for making genetical studies of strains with high rates of mutation and segregation.

120. LEDERBERG, J.  
**Detection of fermentative variants with tetrazolium.**

J. Bact. 1948 : 56 : p. 695.

Tetrazolium has been used to detect fermentative mutants of *Escherichia coli* K-12 in cultures subjected to ultraviolet irradiation; non-fermenting organisms are stained a deep red whereas variants with a fermentative ability remain neutral in colour.



121. MUDD, S. and SMITH, A. G.  
**Electron and light microscopic studies of bacterial nuclei. I. Adaptation of cytological processing to electron microscopy; bacterial nuclei as vesicular structures.**  
 J. Bact. 1950 : 59 : 561-73.

Descriptions are given of the accentuated patterns of contrast obtained between nucleus and cytoplasm, in *Eberthella typhosa* and *Escherichia coli*, using a cytological technique involving osmic acid vapour; the technique has been adapted for observations by light and electron microscopes which are used to supplement one another. The results of observations indicate that bacterial nuclei have a lower density than the cytoplasm and retain definite boundaries; they appear to exist as vesicles containing chromatin.

122. KELNER, A.  
**Action spectra for photoreactivation of ultraviolet-irradiated *Escherichia coli* and *Streptomyces griseus*.**  
 J. Gen. Physiol. 1951 : 34 : 835-52.

The action spectra for light induced recovery from lethal effects due to ultraviolet irradiation (cf. Abst. 81) were between 365 and 500 m $\mu$  for *S. griseus* and between 365 and 470 m $\mu$  for *E. coli*. The most effective wave lengths were 436 and 375 m $\mu$ , respectively. This difference is attributed to the specific nature of the chromophores which absorb reactivating light in the two organisms. The resemblance between photoreactivation action spectra and the action spectra of different light sensitive enzymes is discussed in an attempt to identify the chromophores involved.

123. ANDERSON, E. H.  
**Heat reactivation of ultraviolet-inactivated bacteria.**  
 J. Bact. 1951 : 61 : 389-94.

The magnitude of reactivation resulting from increasing the incubation temperature of several ultraviolet-inactivated strains of *Escherichia coli* by 10°C approximates to that obtained by exposure to light (cf. Abst. 81). Similar attempts to reactivate ultraviolet-inactivated strains of *Saccharomyces cerevisiae* were unsuccessful. Heat reactivation does not occur readily in X-ray-inactivated organisms:

124. MILLER, H., FARGHALY, A. and MCELROY, W. D.  
**Factors influencing the recovery of biochemical mutants in luminous bacteria.**  
 J. Bact. 1949 : 57 : 595-602.

A relatively low mutation rate was observed after treating the luminous bacterium, *Achromobacter fischeri*, with ultraviolet radiation or nitrogen mustard. On minimal medium just sufficient to support the normal wild strain at 8°C there is a selective advantage favouring the mutants, as the latter thrive under such extreme conditions. Using this technique it has been possible to increase the apparent mutation rate over 20 times (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1635).

125. YEGIAN, D. and BUDD, V.  
**Heterogeneous character of streptomycin-dependent mutants of a mycobacterium.**  
 J. Bact. 1951 : 61 : 161-65.

Two distinct streptomycin dependent forms designated Dep 1 and 2, have been recovered from *Mycobacterium* strain RB1. Although the progeny of Dep 1 were all streptomycin sensitive and all Dep 2 progeny were streptomycin resistant, segregation occurred in respect of colonial morphology, pigmentation and growth rate to produce six new variants, all of which bred true. The heterogeneous nature of the original streptomycin dependent mutants, Dep 1 and 2, is thought to be due to an asymmetrical partition of genetic material during cell division, whereas subsequent progeny are genotypically homozygous. It is expected that further investigations may reveal close analogy to the heredity mechanisms found in higher organisms.

126. ARK, P. A.  
**Phenotypic variations induced by chemicals in *Corynebacterium michiganense* and *Xanthomonas juglandis*.**  
 J. Bact. 1951 : 61 : 293-97.

Although both *C. michiganense* and *X. juglandis* are normally very stable, numerous mutants were produced in both species by treatment with 14 chemicals of the naphthalene group and the chloride, nitrate and sulphate of uranium.

127. DIENES, L.,  
WEINBERGER, H. T. and  
MADOFF, S.  
**The transformation of typhoid bacilli into L forms under various conditions.**  
J. Bact. 1950 : 59 : 755-64.

An investigation of L type cultures isolated from *Salmonella typhosa* has established that under conditions resulting in injury to the parent strain some survivors are transformed into L forms. Certain conditions inducing transformation, such as high concentrations of glycine and penicillin, are not encountered by the bacteria in their normal environment, but lysis by sera or bacteriophages probably occurs frequently. It is suggested that the ability to undergo transformation to an L type is an important method of survival.

128. DEMEREC, M.  
**Induction of mutations in *Escherichia coli* by manganous chloride.**  
Science 1951 : 113 : p. 473. (Abst.).

Manganous chloride has a strong mutagenic effect upon *E. coli*, as shown by a study of mutants involving phage resistance and streptomycin dependence (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1476). The degree of mutagenicity of  $MnCl_2$  is considerably influenced by the condition of the bacteria, the effect depending for instance upon the temperature during treatment, concentration of  $MnCl_2$ , duration of treatment, and washing of the bacteria in solutions of NaCl and other chemicals before treatment. Identical treatment with  $MnCl_2$  may induce from 0 to  $2 \times 10^4$  mutants per  $10^8$  treated bacteria, depending on the condition of the cells. The mutagenic effect apparently depends on the intake of  $MnCl_2$  and on the amount that is bound by the treated cells.

129. DEMEREC, M.,  
BERTANI, G. and  
FLINT, J.  
**A survey of chemicals for mutagenic action on *E. coli*.**  
Amer. Nat. 1951 : 85 : 119-36.

Tests were carried out on the ability of 31 organic and inorganic compounds to induce back mutations from streptomycin dependence to nondependence in *Escherichia coli*. Mutagenicity was shown by widely different chemicals, such as boric acid, ammonia,

hydrogen peroxide, copper sulphate, acetic acid, formaldehyde and phenol.

130. GOTS, J. S. and  
SEVAG, M. G.  
**Enzymatic studies on the mechanism of the resistance of *Pneumococcus* to drugs. I. Studies of the dehydrogenase activities and interrelationships of pneumococci susceptible and resistant to acriflavine, atabrine, optochin, propamidine, and sulfonamides. III. Experimental results indicating alteration in enzyme proteins associated with the development of resistance to drugs.**  
J. Bact. 1948 : 56 : 709-22, 737-48.

Development of resistance to acriflavin, atabrine, optochin, propamidine and sulphonamides was investigated in three strains of *Diplococcus pneumoniae*. Data are presented on degree of resistance developed, number of transfers to media of increasing concentration necessary for the development of maximum resistance, stability of resistance once gained, proportion of rough and smooth phase variants, occurrence of cross resistance and a comparison of dehydrogenase activities. The riboflavin content of organisms susceptible and resistant to drugs was determined in relation to the decreased dehydrogenase activity exhibited by resistant variants. Although no quantitative difference was found, the dehydrogenase activity was recovered by addition of riboflavin. Development of resistance is considered to involve alteration of the protein component of the enzymes concerned; this change is inherited by subsequent generations, and it is assumed that the controlling genetic factors have undergone mutation.

131. HUNTER, M. E.,  
MUDD, S. and  
WOODBURN, M. A.  
**The morphological characteristics of paired sulfonamide-susceptible and sulfonamide-resistant strains of *Staphylococcus aureus*.**  
J. Bact. 1950 : 60 : 315-20.

Although differences in the nuclear cytology of strains of *S. aureus* resistant and susceptible to sulphonamide have not been detected, three resistant strains are larger and more pleomorphic than their susceptible parent strains, are more easily hydrolysed by HCl and stain more readily after hydrolysis.



132. BRUNER, D. W. and EDWARDS, P. R.  
**Changes induced in the 1, 2, 3, antigens of *Salmonella*.**  
J. Bact. 1948 : 55 : p. 137.

Since the changes induced in the nonspecific antigens of *Salmonella* were reported in *Plant Breeding Abstracts*, Vol. XIX, Abst. 141, changes in phase of 13 additional species have been induced by similar methods. A reversible phase change has been accomplished with *S. stanleyi*.

133. DEMEREC, M.  
**Origin of bacterial resistance to antibiotics.**  
J. Bact. 1948 : 56 : 63-74.

Data are presented as evidence that mutations are responsible for the origin of streptomycin resistance in *Staphylococcus aureus*. Resistant bacteria may be found in any large population, the proportion depending on the mutation rate. The stepwise increase in degree of resistance to antibiotics, brought about by selection, is described with reference to the resistance of *S. aureus* to penicillin. It is assumed that mutations in several equally influential genes are effective in inducing resistance; slight resistance, characteristic of the first step, is due to mutation in a single gene; higher degrees of resistance, characteristic of subsequent steps, depend on additional mutations in other genes. An increase in bacterial resistance to streptomycin may also depend on the interaction of several genes, but these vary greatly in their potency. A single mutation may result in a high or low degree of resistance according to the particular gene affected.

Application of penicillin doses sufficiently large to prevent survival of first step mutants avoids development of highly resistant strains; in treatments with streptomycin, however, the development of strains with a high degree of resistance cannot be prevented.

134. PAINE, T. F. (JUN.) and FINLAND, M.  
**Observations on bacteria sensitive to, resistant to, and dependent upon streptomycin.**  
J. Bact. 1948 : 56 : 207-18.

Mutant forms resistant to or dependent upon streptomycin have been obtained from streptomycin sensitive strains of *Staphylococcus aureus*, *Escherichia coli*, *Proteus morgani*, *Pseudomonas aeruginosa* and *Klebsiella pneumoniae*. Evidence suggests that resistance to streptomycin is a relatively permanent reaction, whereas mutant

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strains dependent on streptomycin are comparatively unstable.

135. YEGIAN, D. and VANDERLINDE, R. J.  
**A quantitative analysis of the resistance of mycobacteria to streptomycin.**  
J. Bact. 1948 : 56 : 177-86.

Data are presented on statistical analyses of the rate at which spontaneous variants occur in cultures of *Mycobacterium tuberculosis* and *M. ranae*. Additional evidence (cf. Abst. 133) was obtained for the establishment of streptomycin resistant variants by gene mutations regardless of the influence of the drug. An increase in the number of variants occurs as the size of the parent population increases, while the drug concentration remains constant. The number of resistant variants in a given susceptible population is directly affected by the concentration of the drug present in the medium. Under natural conditions resistant variants are generally stable but from a culture of a resistant variant of *M. ranae*, it has been possible to isolate a strain requiring streptomycin and resembling the original parent strain in other cultural and morphological characters, thus demonstrating the occurrence of reversible mutations.

136. MITCHISON, D. A.  
**The segregation of streptomycin-resistant variants of *Mycobacterium tuberculosis* into groups with characteristic levels of resistance.**  
J. Gen. Microbiol. 1951 : 5 : 596-604.

Streptomycin sensitive strains of *M. tuberculosis* grown on agar containing graded concentrations of streptomycin produced streptomycin resistant variants which segregated into three distinct groups; this suggests that at least three separate biochemical processes are affected by streptomycin. Slightly resistant strains may have developed an alternative pathway for one of these processes, moderately resistant strains may have alternatives for two processes and strains with a high degree of resistance can probably by-pass all three processes by alternative reactions. The relative proportion of strains was in the ratio 1000 : 100 : 2, respectively.

137. LEDERBERG, J.  
**The selection of genetic recombinations with bacterial growth inhibitors.**  
J. Bact. 1950 : 59 : 211-15.

A streptomycin resistant mutant of *Escherichia*

*coli*, strain 677-sr, and an azide resistant mutant, 478-azr, were crossed in a medium containing both inhibitors. A large number of bacteria resistant to both antibiotics were obtained, showing segregation of genetic characters which confirmed the occurrence of genetic recombination.

138. YEGIAN, D. and  
BUDD, V.  
**Mutation of streptomycin-dependent *Mycobacterium ranae* selected from a sulfathiazole-resistant variant.**  
J. Bact. 1951 : 61 : 167-70.

A streptomycin dependent mutant was selected from a sulphathiazole resistant variant which arose in a streptomycin sensitive culture. Three morphologically distinct forms, resulting from subsequent mutations, were isolated from cultures of the streptomycin dependent variant; these forms differed in sensitivity to sulphathiazole and streptomycin. Cultures of each of the three morphological forms gave rise to the same type of progeny.

139. NEWCOMBE, H. B. and  
HAWIRKO, R.  
**Spontaneous mutation to streptomycin resistance and dependence in *Escherichia coli*.**  
J. Bact. 1949 : 57 : 565-72.

The estimated rates of mutation of *E. coli*, strain B/r, to streptomycin resistance and streptomycin dependence are both approximately  $1 \times 10^{-10}$  per bacterium per division cycle. By using two different formulae to calculate the rate of mutation to streptomycin resistance, equal estimates have been obtained, indicating either dominance of the mutant gene or absence of delay in the phenotypic expression of this spontaneous mutation (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 825).

140. ENGLISH, A. R. and  
MCCOY, E.  
**A study of streptomycin resistance in *Micrococcus pyogenes* var. *aureus*.**  
J. Bact. 1951 : 61 : 51-56.

Evidence is presented in favour of spontaneous random mutations followed by biological selection to account for the origin and establishment of streptomycin resistant individuals within a susceptible population. Resistant forms failed to develop under conditions allowing the possibility of adaptation in the presence of streptomycin when selection was prevented, yet when selection was allowed, resistant strains were readily isolated. Mutant

strains were also obtained from streptomycin-free cultures of *M. pyogenes* var. *aureus*; these were later found to possess resistance to 1000 units per ml. of streptomycin.

141. DAVIS, F. L. and  
WILLIAMS, O. B.  
**Studies on heat resistance. I. Increasing resistance to heat of bacterial spores by selection.**  
J. Bact. 1948 : 56 : 555-59.

The results of heat resistance studies on the spores of *Bacillus globigii* indicate wide variation, with respect to the degree of susceptibility to heat, in a single colony. By selection of survivors after heat treatment, quantitative and qualitative increases in resistance have been effected.

142. DAVIS, F. L. (JUN.),  
WYSS, O. and  
WILLIAMS, O. B.  
**Studies on heat resistance. II. Comparison of resistance to heat with resistance to disinfectants.**  
J. Bact. 1948 : 56 : 561-67.

A comparison of the reaction of bactericidal chemicals on spores of a culture of *Bacillus globigii* and a heat resistant variant (cf. Abst. 141) has shown that spores withstanding heat are more resistant to iodine and phenol than those of the original culture.

143. PUCK, T. T.  
**A reversible transformation of T1 bacteriophage.**  
J. Bact. 1949 : 57 : 647-55.

Evidence is presented for the existence of a reversible mutation in T1 bacteriophage. The two forms react differently towards *Escherichia coli* and show many other divergent physiological characteristics.

144. MAALØE, O. and  
WATSON, J. D.  
**The transfer of radioactive phosphorus from parental to progeny phage.**  
Proc. Nat. Acad. Sci., Wash. 1951 : 37 : 507-13.

During two successive cycles of reproduction, phage T2r<sup>+</sup> containing radioactive P<sup>32</sup> grew in unlabelled bacteria. Only approximately 30% of the P<sup>32</sup> content of infecting phage particles was transmitted to the subsequent phage generation in each cycle. It is supposed that the P<sup>32</sup> was not located, after this transmission, in any specific part of the desoxyribose nucleic acid within the phage.



145. LURIA, S. E., and  
HUMAN, M. L.

**Chromatin staining of bacteria during bacteriophage infection.**

J. Bact. 1950 : 59 : 551-60.

Cytological observations of chromatin-stained *Escherichia coli*, containing adsorbed bacteriophages, revealed chromatin changes correlated with phage specificity. The cells generally swell after disruption of chromatic bodies by certain T phages and become filled with granular chromatin. When irradiated with ultraviolet light the phages may be inactivated, resulting in dispersion and ultimate disappearance of the chromatin; some phages, however, continue to cause accumulation of chromatin when they have been inactivated.

146. MURRAY, R. G. E.,  
GILLEN, D. H. and  
HEAGY, F. C.

**Cytological changes in *Escherichia coli* produced by infection with phage T2.**

J. Bact. 1950 : 49 : 603-15.

Data are presented concerning the succession of changes occurring in *E. coli*, strain B, after infection with either phage T2r or T2r<sup>+</sup>.

Changes in desoxyribonucleic acid and ribonucleic acid reflected by the cytological observations are compared with changes reported by Cohen, particularly the increase of desoxyribonucleic acid after infection, which corresponds with the first appearance of a granular chromatin structure. It is suggested that the points of chromatin synthesis may be centres of phage reproduction. A cylindrical distribution of chromatin in the cell during the latent period of phage infection is postulated.

147. HERRIOTT, R. M.  
**Nucleic acid synthesis in mustard gas-treated *E. coli* B.**  
J. Gen. Physiol. 1951 : 34 : 761-64.

Desoxypentose nucleic acid (DNA) formation ceased in *Escherichia coli* strain B, after treatment with an aqueous solution of mustard gas, although pentose nucleic acid (PNA) was produced in almost normal quantity. When these cells were infected with phage T2 the PNA content decreased while the amount of DNA rose steadily. It is assumed that the virus substitutes, reactivates or modifies factors necessary for DNA synthesis after the latter have been inactivated by mustard gas.

148. DELBRÜCK, M.  
**Biochemical mutants of bacterial viruses.**

J. Bact. 1948 : 56 : 1-16.

Indole inhibits the adsorption of two phage T4 mutants, T4,11 and T4,12, both of which require tryptophane as a cofactor for adsorption; T4,12 is more sensitive to this inhibitory action. The bacterial hosts produce indole from tryptophane and thus resist invasion by these mutant forms.

149. ANGELL, H. R.  
**Seedling blight. IV. Effect of source of isolates of Pythiaceae on percentage stands of poppies and peas on four steamed soils.**

Aust. J. Agric. Res. 1951 : 2 : 286-94.

Pathogenicity tests of isolates obtained from peas and poppies in New South Wales showed wide variation, although all isolates were capable of infecting both hosts. Microscopic examination indicated the presence of at least two species of *Pythium* but further investigations concerning the basis of observed variability in pathogenicity are necessary.

150. REESE, E.,  
SANDERSON, K.,  
WOODWARD, R. and  
EISENBERG, G. M.  
**Variation and mutation in *Penicillium chrysogenum*, Wis. Q176.**  
J. Bact. 1949 : 57 : 15-21.

Several mutants of *P. chrysogenum*, Wis. Q176, produced by ultraviolet irradiation and nitrogen mustard treatment, have outyielded the penicillin production of the parent strain by at least 50%. A larger number of variants was produced by irradiation than by nitrogen mustard treatment, but mutants surviving the latter treatment outyielded other forms.

151. BJÖRLING, K.  
Über die Entwicklungsgeschichte, Variabilität und Pathogenität von *Sclerotinia trifoliorum* Erikss. (On the developmental history, variability and pathogenicity of *S. trifoliorum* Erikss.).  
Phytopath. Z. 1951 : 18 : 129-56.

This paper, which is based largely on the work already published in Swedish (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 579), contains sections on variation in the fungus, e.g. biotypes and pathogenic races, and on the difficulties to be overcome in any attempt to evolve resistant clover strains.

152. WAGNER, C. E. and  
BEADLE, G. W.  
**Mutations produced by atomic bomb  
irradiation of *Neurospora crassa*;  
Appendix No. 16 to the Final Report.**  
US Atom. Energy Comm. 1949 : NP-  
1904 : Pp. 8. [from Nuclear Sci. Absts.  
1951 : 5 : Abst. 2990].

A study has been made of 80 biochemical and morphological mutants observed in *N. crassa* which had been exposed to Tests Able and Baker.

153. CUSHING, J. E.,  
SCHWARTZ, M. and  
BENNETT, R.  
**Altered responses of *Neurospora  
crassa* to inhibiting concentrations  
of indole.**  
J. Bact. 1949 : 58 : 433-42.

Descriptions are given of a variant of *N. crassa* capable of vigorous growth in a medium containing high concentrations of indole, sufficient to inhibit growth of the parent strain. The indole resistant form was crossed with the original wild type; segregation ratios observed in the progeny indicate the occurrence of a mutation in a pair of allelic genes.

154. ABRAMS, R.  
**Purine synthesis in a purine-requir-  
ing yeast mutant.**  
J. Amer. Chem. Soc. 1941 : 73 : 1888-89.  
[from J. Inst. Brew. 1951 : 57 : p. 301].

When grown in the presence of glycine-1-C<sup>14</sup>, a wild form of *Saccharomyces cerevisiae* and a purine requiring mutant caused by ultraviolet irradiation both synthesised purine from the glycine, incorporating approximately equal amounts of C<sup>14</sup>. This indicates that the mutant form is not necessarily characterized by a simple block in the synthesis of adenine.

155. **Relation between yeast cytology and  
genetics.**  
J. Inst. Brew. 1951 : 57 : 230-31.

Winge's criticism of the work of Subramaniam and his colleagues, already summarized in *Plant Breeding Abstracts*, Vol. XXI, Abst. 2401, is reviewed.

156. DELAMATER, E. D.  
**The nuclear cytology of the vegeta-  
tive diplophase of *Saccharomyces  
cerevisiae*.**  
J. Bact. 1950 : 60 : 321-32.

A series of photographs demonstrating nuclear division in the vegetative diplophase of *S.*

*cerevisiae* indicates that the nucleus is the chromatinic body lying at one side of the cell; Lindegren considers this to be a centrosome. The organization of this body and stages of division occurring within its boundary correspond to nuclear conditions observed in other fungi. It is suggested that, on the basis of the type of nuclear configuration not infrequently observed, the chromosome number of this phase is probably four, although further application of new and established cytological techniques may reveal a larger number.

At no stage were the intracytoplasmic or intravacuolar granules, considered by Lindegren to constitute chromosomes, observed in this investigation.

157. ROYAN, S. and  
SUBRAMANIAM, M. K.  
**Critical evidence for mitosis in  
yeasts.**  
Curr. Sci. 1951 : 20 : 161-62.

A typical anaphase has been observed in Feulgen preparations of a top yeast mutant possessing a pair of chromosomes dissimilar in size.

158. SPIEGELMAN, S.,  
DELORENZO, W. F. and  
CAMPBELL, A. M.  
**A single-cell analysis of the trans-  
mission of enzyme-forming capacity  
in yeast.**  
Proc. Nat. Acad. Sci., Wash. 1951 : 37 :  
513-24.

Analyses of the capacity of successive generations of *Saccharomyces Chevalieri* strain C<sub>1</sub>d for growth on a galactose substrate show that the inheritance of a long term adaptation to galactose is of a particulate nature. The particles responsible for enzyme formation are distributed at random among the progeny. Data indicate that the initial number of particles in an adapted cell is about 100. There is apparently a mechanism by which particles are generated, since a few offspring from an unadapted cell possessed the capacity of adaptation.

159. MYZNIKOVA, S. L. and  
ŽURAVLEVA, V. P.  
**(Local races of yeasts).**  
Vinodelie Vinogradarstvo SSSR (Wine-  
making Viticult. USSR) 1951 : No. 5 :  
27-30. [Russian].

Descriptions are given of two Turkmenian yeasts, Terbaş 2 and Kara Uzjum 1, which are



capable of fermenting juices with high sugar content and are tolerant of high temperatures. These yeasts are regarded as superior to Steinberg 92 under the conditions of the Ashabad province.

160. FISCHER, G. W.

**Induced hybridization in gramini-coloured smut fungi. I. *Ustilago hordei* x *U. bullata*.**

Phytopathology 1951 : 41 : 839-53.

Detailed descriptions are given of nine hybrids obtained from crosses at the Institute of Agricultural Sciences, Washington, between one race of *U. Hordei* and four races of *U. bullata*. All the  $F_1$  hybrids, grown on *Elymus canadensis* and *E. glaucus*, had echinulate spores; this indicates a partial dominance of the genetic determinants of the granular verrucose walls found in *U. bullata* over the factors controlling the smooth spores of *U. Hordei*. Unfortunately the  $F_2$  populations were too small to permit adequate ratio studies.

Some of the  $F_2$  hybrids possessed characteristics sufficiently distinctive to suggest that new species may have originated in the Ustilaginales by interspecific hybridization.

161. WHITEHOUSE, H. L. K.

**A survey of heterothallism in the Ustilaginales.**

Trans. Brit. Mycol. Soc. 1951 : 34 : 340-55.

A critical study of heterothallism has been undertaken to determine the validity of claims for complex genetical control by multiple allelomorphs. The existence of multiple allelomorphs is suspected if all pairings between spores from different fruit bodies are compatible; further proof is obtained if there is no recombination between factors controlling heterothallism in the next generation. Conversely, the development of both compatible and incompatible strains from spores of more than one fruit body indicates that heterothallism is dependent on only two allelomorphs; additional evidence is available if hybridization is possible between related species in which + and - strains correspond.

Investigations using numerous genera and species have shown that claims of multiple allelomorphic control cannot be substantiated. In *Ustilago longissima* the supposed multiple allelomorphs are factors which affect the appearance of the hyphae or the degree of pathogenicity; it is assumed that the three strains apparently showing mutual cross compatibility were merely two compatible strains

with which a sterile dicaryon had become passively involved. Throughout the order heterothallism is of a simple nature controlled by a single pair of allelomorphs.

162. HASSEBRAUK, K.

**Über eine rostwiderstandsfähige Dauermodifikation bei *Tanacetum vulgare* L. (A rust-resistant dauermodification in *T. vulgare* L.).**

Ber. dtsch. bot. Ges. 1951 : 64 : 116-19.

A bushy form of *T. vulgare* proved to be resistant to *Puccinia Tanacetii*, as opposed to the normal form growing beside it. The abnormality was perpetuated when the plants were reproduced by cuttings but disappeared entirely on multiplication by seed. The germination percentage of rust spores was almost twice as great in sap expressed from the resistant plants as in sap from normal plants.

163. WHITE, L. T.

**Studies of Canadian Thelephoraceae. VIII. *Corticium galactinum* (Fr.) Burt.**

Canad. J. Bot. 1951 : 29 : 279-96.

The taxonomy of the genus *Corticium* is discussed. Results of experiments in which monosporous cultures from single fruit bodies of *C. galactinum* were paired in all possible combinations indicate the existence of tetrapolar heterothallism; multiple allelomorphs are present at the loci which determine interfertility relationships.

## INSECTICIDES

164.

**The Pyrethrum Board of Kenya Annual Report 1949 : Pp. 25.**

Seed of the pyrethrum cross 188 x 214 is to be issued in 1951: this strain equals 188 x 194 in yield but has a higher pyrethrin content (cf. Abst. 1680). Both strains give a satisfactory performance not only at 7,000 ft. but also at 8000 ft. and even higher altitudes. A new strain, 1970 Control, which has given good results at the higher altitudes, was planted in an isolated block for immediate seed production and further breeding work.

165. SHIMOTOMAI, N.

**(On polyploidy in *Chrysanthemum cinerariaefolium*).**

Jap. J. Genet. 1946 : 21 : p. 83. [Japanese].

Cytological examination of the root tips of Japanese varieties of *Ch. cinerariaefolium* has revealed chromosome numbers of  $2n = 18$  in

some forms and  $2n = 27$  in others. Tetraploids have also been raised by treatment with colchicine.

166. HAGEMAN, R. H.  
**Flowering induced on *Derris elliptica*.**  
 Trop. Agriculture, Trin. 1950 : 27 : 225-26.

Under normal conditions at the Federal Experiment Station, Mayagüez, Puerto Rico, Changi III flowers annually but Sarawak Creeping and St. Croix never blossom. Flowering was, however, induced in both hitherto flowerless varieties during 1949 and again in 1950 by training the vines on trellises where they were exposed daily to full sunlight. Besides influencing production of flowers, trellising in the open increases vegetative vigour.

167. HAGEMAN, R. H. and  
 PAGAN, C.  
**The effect of season on the propagation of *Derris* and *Lonchocarpus*.**  
 Trop. Agriculture, Trin. 1950 : 27 : 223-24.

The results of this investigation have already been summarized in *Plant Breeding Abstracts*, Vol. XXI, Abst. 1687.

## CROP PLANTS

168. **Reports (abridged) to the Annual General Meeting 31st July 1951 by the Board of Directors and the Director of the Scottish Society for Research in Plant Breeding 1951 :**  
 Pp. 36.

### Oats

Forty grains were obtained from the acenaphthene-treated hybrid of *Avena barbata* x *A. strigosa*. Should these produce hexaploid plants they will be crossed with *A. sativa* ( $2n = 42$ ) in an attempt to obtain a commercially acceptable variety with the alkaline tolerance of *A. strigosa*. Data are presented on a replicated trial of 19 promising selections in comparison with the standards Star, Sun II, Yelder and Onward (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 865); nine selections, whose characteristics are described, have been numbered Aa 724 to Aa 732 and multiplied prior to regional trials in Scotland and England.

Several selections have been made showing some degree of resistance to *Helminthosporium Avenae* and *Fusarium* spp.

In connexion with the prevention of losses due to sprouting in the stook (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 865), a number of

selections exhibiting a high level of dormancy during harvest are to undergo further trial.

### Barley

The search for promptly germinating barley has continued; several selections showing a tendency to sprout soon after harvesting have been obtained.

### Forage grasses

Efforts are being made to breed a late ryegrass which can be more easily cut than the present densely growing strains.

Various populations of both British races of *Festuca ovina* (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 865) are being studied in trial plots to ascertain the extent of interracial and intraracial differences.

### Swede

Large scale selection has been undertaken to improve the root shape of Ds 32 which is above average in respect of yielding capacity, percentage of dry matter and winter hardiness. The results of trials with selections from the strains ANI, AOE, AOG and AMJ are reported. Club root resistance tests with Ds 32 and AOG have been continued.

### Potato

Results of investigations concerning resistance to seven strains of *Phytophthora infestans* show that the hypersensitive reaction possessed by *Solanum demissum* is controlled by at least four independent genes. Breeding work is being carried out to recombine all available genes for resistance and thus create in commercially acceptable varieties an increased degree of resistance. Plants with resistance to mosaic, leaf roll and scab are being incorporated to combine resistance to as many diseases as possible within a single variety.

Plants carrying the genes *Nx* and *Nb* have shown immunity to newly isolated strains of virus X. Observations concerning resistance of a wide range of varieties and exotic species to several strains of virus Y indicate that there is a close relationship between five strains, each of which induced lethal necrosis in *S. simplicifolium* and *S. demissum*. There are indications of a complex linkage group involving genes responsible for reaction to infection by A, X and Y viruses. Components of this group are being combined from three different sources. Additional observations of progenies from hexaploid *S. demissum* provide evidence that necrotic reaction to virus Y in this species is controlled by a single dominant gene. Breeding to combine resistance to A, X, Y and the leaf roll virus with resistance to blight has continued.



Hybrids showing frost resistance have arisen from crosses between commercial varieties and an octoploid obtained by treating seed of the tetraploid hybrid *S. acaule* x *S. depexum* with colchicine. The inheritance of resistance to low temperatures is being investigated.

The relative performances of seedling selections and varieties grown in different parts of Scotland, England, South Africa, Kenya and Tanganyika are reported with particular reference to disease resistance.

### **Sugar beet**

Trials for resistance to bolting have continued (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 865). Several strains from the Cambridge Plant Breeding Institute were less liable to bolt under Scottish conditions than the German variety Klein AA.

### **Broccoli**

In order to reduce variation in leaf form, seed is to be produced from certain desirable selections only.

### **Kale**

Work has begun on increasing numerous inbred lines, derived from crosses between kale and other forms of *Brassica*, so that hybrid vigour may be restored.

### **Bean**

Certain promising selections are being multiplied for inclusion in yield trials at a number of bean growing centres.

169.

### **Twelfth General Report of the Ministry of Agriculture, Government of Northern Ireland 1951 : Pp. 152.**

### **Oats**

Breeding is in progress to combine early ripening and strength of straw.

### **Ryegrass**

Selection of improved disease resistant strains of Irish commercial perennial ryegrass has been initiated.

### **Flax**

Improved quality and yield of fibre and disease resistance are being sought by breeding.

170.

### **Report of the Rothamsted Experimental Station, Harpenden 1950 (1951) : Pp. 183.**

### **Avena**

Distribution of the wild oats *A. fatua* and *A. ludoviciana* in England is being studied.

### **Maize**

Several Wisconsin hybrids gave good crops of grain at Woburn, in spite of a very wet season. W 240 appears to be the most promising, and

has given an average yield of 32.6 cwt. per acre during 1948 to 1950. Further tests are to be carried out, with a view to making varietal recommendations, at least for smallholders.

### **Potato**

Destruction of leaf roll virus in tubers of Majestic by heating for 20 or more days at 37.5° C was confirmed. Third generation progeny from the heated tubers showed no symptoms.

### **Sugar Beet**

Further selections were made from plants showing relatively little yellowing in the field; in glasshouse tests progeny of these selections were no more difficult to infect with yellows virus, by aphids, than the progeny of other lines, but in the field some remained greener when infected.

The yellowing disease (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 2730) first found in an Irish line (family 41) is not related to beet yellows virus; the condition can be seed transmitted in other lines of beet, such as Kleinwanzleben E. Infected seedlings were obtained from crosses only when the female parent was infected.

### **Soya bean**

Swedish varieties are under trial.

171.

JENKIN, T. J.

### **The Welsh Plant Breeding Station. Brit. Agric. Bull. 1951 : 4 : 133-39.**

A general account of the work carried out at the station since its establishment in 1919 indicates the progress made in the techniques of breeding and selection, assessing the potentialities of native strains and producing improved varieties of cereals, forage grasses and legumes to meet different requirements, maintenance of stability within a particular strain and seed multiplication.

172.

Tätigkeitsbericht der Kaiser-Wilhelm-Gesellschaft zur Förderung der Wissenschaften und der Max-Planck-Gesellschaft zur Förderung der Wissenschaften für die Zeit vom 1.1.1946 bis 31.3.1951. (Report on the work of the Kaiser Wilhelm Society for the Promotion of Science and the Max Planck Society for the Promotion of Science for the period from 1.1.1946 to 31.3.1951).

Naturwissenschaften 1951 : 38 : 361-80.

Max-Planck Institute for Research on Fibres.

The institute is engaged in the following research projects: a systematic survey of the numerous forms of *Linum usitatissimum*; sex inheritance

in *Cannabis*; the relation between HCN formation, hereditary form and conditions of cultivation; production of polyploid races of flax and hemp; the occurrence of races of fungi pathogenic to flax; heterosis and the action of recessive genes in reducing yield; the maximum limits of fibre and oil contents; fibre flax x linseed crosses; breeding for resistance to diseases and pests; genetic and developmental studies on the evolution of cultivated flax and the problem of gigas growth of cultivated and wild plants; the elimination of genes in crosses between forms with large and with small cells; cell size and performance in flax; cell size in relation to quantitative inheritance, and the evolution of the Linaceae.

*Max-Planck Institute for Biology.*

Botanical research has included work on vernalization and photoperiodism in *Hyoscyamus niger*, whilst the Biochemical Section of the Institute investigated mutants of tobacco mosaic virus with special reference to the chemistry of mutation.

*Max-Planck Institute for Research on Breeding.*

A detailed list is given of all the problems being investigated in plant breeding, genetics and cytology.

173. STRAŇÁK, J.

O výsledcích tříleté šlechtitelské práce na ČSSS. (**The results of three years' breeding work on Czechoslovakian state farms.**)

Věstn. Čsl. Akad. Zeměd. 1951 : 25 : 314-18.

**Cereals**

Breeding aims include resistance to drought and lodging. Varieties suitable for combine harvesting and varieties showing marked heterosis when crossed are being sought. Several new varieties of cereals have been released and 24 varieties are still under trial.

**Forage plants**

Over a dozen new varieties have been bred; some are still passing through their trial stage. Clovers have an important place in the breeding programme.

**Roots and tubers**

Several varieties of root crops and potatoes have been released, while a larger number is under trial. In the sugar beet, high sugar yield and resistance to bolting are wanted. The potato is being bred for productiveness, earliness and lateness, flavour, shallow eye, starch content and the colour and shape of tuber.

**Fibres and oil plants**

Three new flaxes and one linseed variety have been released and one white seeded poppy variety grown for its oil is being tested. It is hoped to obtain varieties of monocious hemp and safflower.

**Hop**

Three new varieties have been released.

**Fruits and nuts**

Breeding work with pome fruits, stone fruits, small bush fruits and walnut is in progress.

**Vegetables**

New varieties of pea, bean and lentil have been obtained. Varieties tolerant of long day and a bean producing pods at a certain level above the ground are wanted. During the last three years, 22 new varieties of other vegetables have been bred.

174.

Institut National de la Recherche Agronomique. Rapport Annuel 1948. (**National Institute of Agronomic Research. Annual Report 1948.**) Paris 1950 : Pp. 80.

**Cereals**

From information acquired during the past six years it has now become possible to define the regional adaptation and quality of the main cultivated varieties and of some recently bred. Four groups of wheat have been established, one for the east of France, one for the centre, one for the south, and one which includes highly productive and early wheats suitable for almost any region with good soil.

The descriptive survey of the French populations of maize has also been completed and selected strains of certain varieties are being multiplied. Work on hybrid maize is now proceeding.

Rice varieties in cultivation at Camargue and others recently introduced have proved highly heterogeneous and are to be reselected to obtain earlier lines with stiffer straw.

**Forage plants**

Special attention has been given to the study of ecotypes in France of lucerne, sainfoin, cocksfoot and ryegrass and their value as compared with strains selected in other countries. Five French ecotypes of lucerne have been identified and their suitability for various conditions determined. In general, it appears that foreign strains can have only a limited use in France, while the French ecotypes should provide valuable material for selection work.

**Potatoes**

The variety bred by the Châteaulin station,



B.F. 15, will be multiplied in view of its usefulness as a semiearly potato.

### Beetroot

European races of *Cercospora* are apparently not identical with the American races.

### Oil crops

Successful selections of flax, colza and safflower have been made. Flax varieties will be studied for their regional suitability to different districts in France.

### Fruit

Investigations on natural and artificial peach x almond hybrids and on the biology of flowering and incompatibility in plum and peach are in progress. At Clermont-Ferrand a study of the flower characters of apple varieties and, at Antibes, two monographs on citrus fruits that can be grown in the Mediterranean region have been concluded.

### Chestnut

Preliminary results have shown resistance to ink disease to be recessive and among seedlings from Japanese or hybrid chestnuts a high percentage of susceptible plants have been found. Some French populations appear to be resistant to some extent and selection might therefore be of use and should also be tried as a way of combating *Endothia parasitica*.

175.

\*(The winners of Stalin prizes for 1950).

Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 5 : 3-6. [Russian].

Several varieties of potato, apple, gooseberry and vine recently developed in the USSR are listed.

### Potato

Mention is made of early, wart resistant varieties, bred in Leningrad, and productive varieties bred at the White Russian Breeding Station showing resistance to wart and *Phytophthora*.

### Apple

Several late and early apple varieties, remarkable for their hardiness, productiveness and good quality of their fruits have been developed at the Mleev Research Station. The best hardy varieties bred at the Moscow State University include early summer varieties and several late winter apples which will keep until April. The best hardy varieties developed at the Čeljabinsk Fruit and Vegetable Station and at the Far Eastern Scientific Research Institute of Agriculture are listed.

### Gooseberry

Varieties with good economic properties have been developed at the Timirjazev Agricultural Academy.

### Vine

Some hybrid vines bred at the Baškirian Fruit Research Station and at the USSR Central Genetical Laboratory are remarkable for their hardiness.

176. ADAMEC, J.

Organisace výzkumnické a šlechtitelské práce v rostlinné výrobě v SSSR. (**The organization of plant research and breeding practice in the USSR**).

Zem. Pokrok 1950 : 17 : 174-75.

The Soviet system of organization of plant breeding is described.

177. SERGEEV, L. I.

(**For the introduction of subtropical plants into industry**).

Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 6 : 39-41. [Russian].

Breeding various subtropical plants for quality and hardiness at the Nikita State Botanical Garden is reported. Over 40 promising varieties and hybrids have been released for state trials.

### Citrus fruits

New varieties and hybrids, including five new oranges, have been obtained.

### Other fruits

Some promising varieties of fig, almond and pomegranate have reached the trial stage.

### Eucalyptus

Hardy material, including some hybrids bred by Popov and Nikolaev, has been obtained by breeding and selection. Training for hardiness is in progress.

### Castor oil

New varieties have been developed. In hardiness trials, Nikitskiĭ 1 [Nikita 1] and Krymskiĭ 172 [Crimean 172] gave good results.

178. DE HAAN, H.

De plantenveredeling in het jaar 1950. (Een halve eeuw na de herontdekking van de wetten van Mendel). (**Plant breeding in the year 1950. (Half a century after the rediscovery of the laws of Mendel)**).

Jaarb. Algem. Bond Oud-leerl. Middelbaar Landbouwonderwijs, Wageningen 1951 : 31-40.

Reviewing the advances that have been made in practical plant breeding since 1900, the

\* An extended summary of this paper is on file at the Bureau.

author points to the important roles played by land races and hybrid populations as a source of breeding material, with remarks on the possibilities inherent in interspecific hybridization, by means of which new species of potential value for the breeder may be obtained. Heterosis too may be made use of to increase yield, while resistance to disease may be introduced into promising material as a means of rendering yield itself more reliable.

179. WELLENSIEK, S. J.  
**Horticulture and horticultural research in Holland.**  
Sci. Hort. 1950-51 : 10 : 16-29.

Various horticultural problems which are being solved by research are reviewed briefly. Particular reference is made to the development of a new technique for selecting male asparagus (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1203), and vegetative propagation of Brussels sprouts for conserving desirable genotypes for further breeding (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 1761).

180. HEYNE, E. G.  
**Plant breeding in Japan.**  
Prelim. Stud. Natural Resources Sect.  
Gen. Hdqrs Allied Powers, Japan 1951:  
No. 52 : Pp. 30. (Mimeographed).

Breeding of cereals and other crops is surveyed under the following headings: brief history of plant breeding accomplishments in Japan; methods of breeding; breeding for disease resistance; methods of testing breeding material; source of germ plasm for the breeding projects; distribution of varieties of crop plants; publications pertaining to breeding; and status of the national breeding programme. The recommendations for improvement in the efficiency of breeding procedures include less detailed plant study of segregating populations, use of several breeding methods, establishment of uniform experiments and use of proper experimental designs in yield tests. Attention is drawn to the advanced state of work on the colchicine induction of polyploidy, and it is suggested that continuation of this work should be encouraged. It is further suggested that the establishment of a system of plant introduction and preservation of genetic stocks, on a coordinated national basis and in cooperation with FAO, should receive consideration. Appendix A deals with (1) the value of simple and compound hybridization, back crossing, and the application of the bulk method to hybrid material, and (2) the general technique of breeding for disease

resistance. In appendix B the special problems of breeding for disease resistance in wheat and barley are indicated and appropriate procedures suggested.

181.

**Annual Report of the Indian Council of Agricultural Research for 1949-50 (1951) : Pp. 81.**

**Wheat and barley**

Extensive work on the breeding of wheat varieties combining resistance to all three rusts has been initiated. At Almora, UP, the effects of vernalization on the yield and other characters of wheat and barley strains were investigated.

**Maize**

Schemes for breeding hybrid maize at several stations have been sanctioned. Pending the development of hybrids in India, seed is to be imported from the USA for testing. Work on the production of hybrid maize has already reached an advanced stage at the Indian Agricultural Research and Punjab stations.

**Millet**

Improved millet strains have been developed in Madhya Pradesh and are being multiplied; work on the development of better strains for Bombay is to be continued. In Mysore promising selections of *Panicum miliaceum*, *P. miliare* and *Echinochloa frumentacea* have been produced; in Uttar Pradesh new strains of *Eleusine coracana*, *Panicum Crus-galli* and *Paspalum scrobiculatum* gave high yields. Multiplication and distribution of hybrid seed of *Pennisetum typhoideum* have been undertaken in Madras.

**Rice**

Six schemes of breeding were in operation. At the Bubar Station, selections from the chief varieties Kada, Wankvel, Early Kolam and Late Kolam were subjected to large scale trials; a selection of Kada, 176-12, yielded 22% more than the local rice. In Kashmir, Chinese varieties gave good results, as in previous years. The following new breeding schemes were sanctioned: development of deep water varieties for Orissa and Uttar Pradesh; improvement of hill rice in Orissa; and production of better varieties of spring rice for West Bengal. In Madras, 300 varieties were tested for blast resistance. Resistance was associated with a high number of silicified epidermal cells per unit area.

**Grasses and legumes**

Breeding work is to be carried out on a regional basis (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2430).



**Potato**

Various regional schemes of improvement were taken over by the Central Potato Research Institute (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2773).

**Sweet potato and tapioca**

A scheme for developing high yielding, disease and pest resistant strains, capable of being grown in any season in Travancore-Cochin, has been sanctioned.

**Cardamom**

Selection for high yield and other characters was carried out in Madras.

**Turmeric**

Of the local types tested in Orissa, Sarangada gave the highest yield.

***Capsicum annuum***

Improvement is in progress.

**Mustard**

A technique for grafting vernalized seedlings on control seedlings has been devised.

**Fruits**

Stations have been established in Madras, West Bengal and Bombay for work on the banana, including varietal collection and hybridization. At Calcutta University breeding is in progress; all varieties of *Musa paradisiaca* are compatible with one another. Cytogenetical investigations on the banana are being carried out in Bombay and other states. Idiograms, relationships between chromosomes and nucleoli and the nature of secondary bivalents in different species have been studied.

Cytogenetical work is being carried out on the mango at several centres; chromosome morphology has been subjected to detailed analysis. A survey of the chief mango varieties grown in India is in progress.

**Pulses**

Improved strains of *Phaseolus* species, *Cajanus* *Cajan* and other pulses have been developed, showing improvements in yield, protein content, cooking quality and disease resistance.

**Coriander**

In Gwalior the local variety showed some promise with regard to *Fusarium* wilt resistance.

182. CHAMBERS, P. C.  
**Annual Report of the Department of Agriculture, Cyprus, for the year 1950 (1951) : Pp. 16.**

**Cereals**

Two wheats derived from crosses between the local Kyperounda and introduced varieties showed considerable promise under the conditions of a severe rust epidemic. Some very early maturing hybrids of maize may be

valuable for grain production on non-irrigated land; hybrids did not show any marked improvement over local maize for forage production.

**Tobacco**

Selection and varietal trials were carried out (cf. Abst. 607).

**Fruits**

Recent introductions of pome and stone fruits and grapes are under observation.

183. MICHAELIDES, R.  
**The Central Experimental Farm, Morphou. Twenty years of work.**  
Countryman, Cyprus 1951 : 51 : No. 8 : 4-5.

The importance of varietal trials of wheat, maize, barley, forage crops, cotton and vegetables carried out in Cyprus on the central experimental farm at Morphou during the past 20 years is emphasized. Constant improvement of varieties by selection and controlled distribution of seed has influenced recent increases in crop production on the island.

184. **Virus diseases of crops in East Africa.**  
World Crops 1951 : 3 : 385-86.

Virus research carried out by the East African Agricultural Research Institute at Amani during the 20 years of its existence, before being incorporated in the East African Agricultural and Forestry Research Organization, is briefly summarized with particular reference to breeding for resistance to streak disease of maize, leaf curl of tobacco, mosaic and brown streak of cassava and groundnut rosette.

185. **Annual Report of the Department of Agriculture, Gold Coast, for the year 1949-50 : Pp. 13. (Mimeographed).**

**Sorghum**

Local strains are being grown under observation. In adaptability trials with dwarf varieties from the USA, Plainsman and Pink Kaffir proved promising. The Nigerian variety, Shika, is to be incorporated in the breeding programme as it often gives grain yields when local sorghums fail to set seed.

**Rice**

Two varieties imported from Malaya showed promise in trials at Tamale; they are to undergo further trials. Selection was continued among native strains.

**Groundnut**

A few varieties undergoing tests at Tamale yielded over 1000 lbs. of unshelled nuts per acre; they are to be given further trial.

## **Soya bean**

Spacing and yield trials of varieties have continued.

186.

**Annual Report on the Agricultural Department of Nigeria for the year 1949-50 (1951) : Pp. 92.**

## **Maize**

Introductions from the USA have been tested for adaptability to local conditions.

The hybrid from Lagos White x Tsolo has out-yielded both parents in trials at Ibadan.

## **Guinea corn**

A single dwarf plant with the desirable characteristics of Farafara has been obtained for future hybridization from a cross between Farafara and Kaura. Further selections from the short variety Kaura are being made.

Methods of mass selection are being investigated to determine possibilities of improving the technique.

Seven strains well adapted to combine harvesting and several types with high sugar content have been received from the USA for breeding purposes. All available varieties and strains are being collected from the Northern Provinces.

## **Forage legumes**

*Stylosanthes gracilis* has shown drought resistance and is otherwise well adapted to local conditions.

Results of trials at Umuahia and Ibadan with a collection of cowpeas from East Africa and types grown locally have confirmed the superiority of the introduced varieties.

## **Cotton**

Promising performances are reported from many selections of 26C and Maiduguri; further selections have been made to obtain strains with desirable lint qualities.

Varieties undergoing trial include introductions from Tanganyika and South Africa.

## **Cassava**

The Gold Coast hybrid GC 997B has been recommended as the standard variety, although it is susceptible to mosaic virus.

## **Tobacco**

The results of a varietal trial carried out at Maigana confirmed the superiority of Virginia Hybrid, now in general use.

## **Cacao**

Hybrids between T 38 and the Trinidad selections ICS 1, 4, 7 and 9 continue to outyield their parents; the hybrids are characterized by vigorous growth and early fruit production.

All local material and introductions from the Amazon and Central America are susceptible to

*Coccotrypes pygmaeus*, which causes seedling dieback in the first dry season.

## **Kola**

The relative proportions of male and female flowers on *Cola nitida* at Moor Plantation are under observation in attempts to find the cause of substantial yield variations.

## **Sesame**

At Yander, an early maturing variety is being sought by selection; some 200 plants maturing 9-16 days earlier than the main crop were obtained. Selection for high yielding capacity is in progress among varieties of normal maturity.

## **Oil palm**

A seedling test is under way to determine whether selection of vigorous seedlings at the nursery stage is of later benefit. A new standard palm has been selected to replace CA 256.

Seed of *Elaeis melanococca* from Colombia and Panama and other species of *Elaeis*, with desirable characteristics, from British Guiana, Peru, Madagascar, Liberia and Zanzibar have been introduced for interspecific hybridization with *E. guineensis*.

The genetic relationships between the *dura*, *tenera* and *pisifera* types are being investigated; progeny of *dura* x *pisifera* crosses are being examined.

Experiments are being undertaken to measure the natural spread of pollen, using the *idolatrix* variety.

Seedlings of known parentage are being used to determine the range of resistance to *Fusarium oxysporum* f. *Elaeidis* which causes vascular wilt.

## **Groundnut**

From the collection of local types (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2156), 80 have proved promising and will undergo further tests. Data from varietal trials are presented; 8 introductions from the USA gave high yields.

## **Soya bean**

Following an outstanding performance during preliminary yield trials, the newly introduced Avoyelles is being tested throughout the Zaria area, where it may replace Benares and Malayan. Varieties received from the Philippines, India and Ceylon have shown promise.

187. STOREY, H. H.

**Basic research in agriculture. A brief history of research at Amani 1928-1947.**

E. Afr. Agric. For. Res. Organ, Pp. 24.

Breeding work with derris, sisal, cassava, coffee



and cinchona is among the topics covered by this review.

188. KEEN, B. A.  
**The East African Agriculture and Forestry Research Organization. Its origin and objects.** [Undated]. Pp. 12.

The main functions of the East African Agriculture and Forestry Research Organization are outlined.

Brief mention is made of work in progress with wheat, cotton, cassava, groundnut and cypress (cf. Abst. 189).

189.  
**Annual Report of the East African Agriculture and Forestry Research Organization 1950 : Pp. 57.**

#### Cassava

Breeding for resistance to mosaic and brown streak has continued by hybridization between *Manihot utilissima* and two resistant woody-rooted species, *M. dichotoma* and *M. Glaziovii*, followed by back-crossing to *M. utilissima* for improved root characteristics. Results of many field tests with selected clones indicate that hybrids derived from *M. Glaziovii* and back-crossed beyond the  $F_3$  are most promising.

Some high yielding hybrids with tolerance of mosaic are being developed as an interim measure until resistant varieties are available.

#### Groundnut

Introduction of noneconomic species of *Arachis* has continued. Each is being tested for reaction to rosette virus, so that resistant forms may be crossed with *A. hypogaea*.

#### Cupressus

*C. lusitanica* is so much more resistant to canker (*Monochaetia unicornis*) than *C. macrocarpa* on a wide range of sites that there appears to be sufficient reason for abandoning cultivation of *C. macrocarpa*. Results of studying the pathogen in culture show that there are two strains differing in virulence and form of growth.

190.  
**Annual Report of the Department of Agriculture, Colony and Protectorate of Kenya, 1949 Vol. II—Record of investigations. 1951 : Pp. 89.**

#### Pyrethrum

Several selections, made from progenies of crosses between clones giving high pyrethrin yields, contain between 2 and 2.5% pyrethrin. Cross 188 x 214 has shown a high average content over 11 pickings and is to be increased for release.

Vigorous seedlings were obtained from crosses between clones having a high pyrethrin content and a vigorous large-flowered strain of upright growth habit.

#### Wheat

Numerous crosses undertaken at Njoro and Rongai are listed. A report of the performances of various selections and introductions indicates that several lines have proved susceptible to the recently discovered race of black stem rust designated K8; the appearance of rust symptoms on 291 J1 II and its progeny suggests the presence of yet another new physiological race, K9. Results of trials of newly released varieties (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 935) and promising selections carried out by breeding stations at high and low altitudes are presented.

#### Oats

Many recent introductions have become severely infected by stem rust during adaptability trials. Sunrise from Southern Rhodesia showed a high degree of resistance and is to undergo further tests.

#### Maize

Breeding for improved hybrids is in progress. Single crosses have been made between selected inbreds produced before the war, in preparation for double-crossing. New inbreds are being developed from local varieties and strains and introductions from the USA, Southern Rhodesia and South Africa. Top crosses of the 1948  $S_1$  lines to local Njoro maize are being tested for combining ability.

Crosses were made between 100 selections in the first stage of breeding by Harland's method of improvement (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 26).

#### Barley

Several new introductions are undergoing observation. The results of yield trials of numerous varieties at Njoro, Rongai and Ol Joro Orok are reported.

#### Sorghum

Breeding has begun for dwarf types suited to combine harvesting. Numerous introductions from the USA show susceptibility to local diseases but it is hoped that their dwarf growth habit will be successfully incorporated in new sorghums which will possess the disease resistance and yielding capacity of local varieties.

#### Potato

Further blight resistant strains have been received from Corstorphine, Scotland, for adaptability trials and multiplication at 8500 ft. Good yields have been obtained from 914a12, 1082a28 and 1095b22.

### Coffee

Varietal trials have been continued. Selection K7 has shown resistance to leaf disease during severe epidemic conditions but is to undergo further selection for improved bean quality.

### Sunflower

During trials of semidwarf types at three stations, Mars has outyielded other varieties including the standard Giant Black except at Kitale. In view of their early maturity, high yielding capacity when closely spaced and suitability for combine harvesting in low areas, cultivation of these semidwarfs is to be encouraged.

### Soya bean

All 26 introductions tested made poor growth; many lodged and all showed a tendency to shatter. It is hoped that better varieties can be introduced, otherwise soya bean cultivation may be abandoned.

191.

**Report of the Department of Agriculture, Nyasaland Protectorate, for the year 1949 (1951) : Part II : Pp. 23.**

### Maize

At Likuni and Lisasadzi, hybrids introduced from Southern Rhodesia have been compared with open-pollinated varieties and local maize.

### Tung

Results obtained from the continuation of trials at the Experiment Station, Cholo, have confirmed the superiority of buddings on *Aleurites montana* compared with selected and unselected seedlings. ZM 13 outyields all other clones (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1685). Several high yielding clones have been selected from among newly developed lines; they will be under observation for the next two seasons.

Although the illegitimate seedling progenies of high yielding mother trees contain some outstanding individuals these are relatively infrequent; consequently, analysis of such progenies has been discontinued. Numerous promising individuals have, however, been obtained from legitimate crosses between high yielding mother trees; records will be kept of their yielding capacity for several years before selections are made.

192.

**Annual Report of the Department of Agriculture, Northern Rhodesia, for the year 1950 (1951) : Pp. 19.**

The results of varietal trials of wheat, oats, maize, sorghum, rice, forage grasses, velvet bean, tobacco and cassava in different provinces are reported.

193.

### Applied Mendelism in Canadian Agriculture.

Z. Pflanzenz. 1951 : 30 : 2-28.

The foreword stresses the value of the application of Mendelian principles in crop breeding in Canada and briefly outlines the organization of breeding in the dominion. Four papers surveying crop improvement during the past 50 years are presented; in general the investigations described have already received attention in *Plant Breeding Abstracts*.

Armstrong, J. M. *Breeding new varieties of forage crops in Canada.* (pp. 3-9).

The crops referred to comprise grasses, including perennial wheat-*Agropyron* lines under test, lucerne, clovers, maize, soya bean, sunflower and annual rape.

Hamilton, D. G. *Breeding new varieties of wheat and oats in Canada.* (pp. 10-17).

A concise review of breeding and genetical work on disease resistance and other characters in spring wheat and oats is given.

Ferguson, W., Spangelo, E. P. and Cameron, D. F. *Horticultural plant breeding in Canada.* (pp. 18-25).

Mention is made of some aspects of vegetable, fruit and ornamental plant breeding; work on the latter groups receives most attention.

White, F. H. *Tobacco breeding in Canada.* (pp. 26-28).

The aims and methods of current breeding work and the results of genetical studies of black root rot resistance and other characters are outlined (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2508).

194. SELL, O. E.

**Fifty years of progress in the South.**  
Crops and Soils : 3 : No. 8 : 18-20.

A popular account is given of the improved characteristics of varieties of wheat, oats, maize, barley, rice, sorghum, forage grasses and legumes, cotton, sugar cane, groundnut and soya bean developed during the past 50 years.

195. TRULLINGER, R. W.

**Report on the Agricultural Experiment Stations, 1950.**

U.S. Dep. Agric. 1951 : Pp. 214.

A concise survey of recent achievements in breeding cereals and other field crops, and fruits, nuts and vegetables, and of their agricultural and economic significance is included. Most of the results described have already been referred to in *Plant Breeding Abstracts*.



196.

**Annual Report of the Massachusetts  
Agricultural Experiment Station for  
the fiscal year ending June 30, 1950 :**  
Bull. No. 459 : Pp. 92.

**Maize**

Early maturing flint x dent hybrids are being sought from single and double crosses (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2167). Promising selections from other flint x dent crosses are undergoing further tests before seed increase. Numerous single crosses of the US 13 and Mass. 62 maturity groups were subjected to selection for specific combining ability.

The development of inbreds from open-pollinated varieties by selection within self-fertilized lines was continued.

A mutant was discovered with stalks containing 35.5% sugar; the possibility of its development for silage is being investigated.

**Forage grasses**

Some very late maturing selections of a Finnish late hay strain of *Dactylis glomerata* have been obtained. The value of such late maturity is doubtful, since it is secured at the expense of vigour and yielding capacity.

**Lucerne**

The yield of Kansas Common lucerne at each of three cuttings exceeded that of Buffalo and Atlantic when grown in soil with low exchangeable potassium content. At the first cutting Atlantic contained 10-30% less potassium and more calcium and magnesium than either Kansas Common or Buffalo; these differences in composition decreased with subsequent cuttings.

**Potato**

A comparison of 27 varieties and strains was effected in respect of yield, growth habit and disease resistance. Green Mountain was particularly susceptible to drought and gave much reduced yields.

**Apple**

Varietal differences have been observed in reaction to spraying with fungicides. Phygon XL, with Epsom salt added to lessen foliage chlorosis, caused russetting of Delicious and foliage chlorosis of Baldwin. Sulphur with lead arsenate and DDT russeted Baldwin but not Delicious, whereas foliage chlorosis was most obvious on Delicious.

Susceptibility to scald during cold storage was reduced on McIntosh and Rhode Island Greening by the presence of carbon; on Cortland, however, scald developed unchecked.

Baldwin trees on Malling V rootstocks were more resistant to winter injury than those grafted on to Malling IV.

**Peach**

Adaptability trials are in progress.

**Raspberry**

The varieties Chief and Washington reacted differently to winter conditions. The respiration rate was lower in the frost injured Washington canes than in those of the hardier variety Chief. Several promising seedlings were selected from about 200 obtained from the New York Agricultural Experiment Station.

**Blueberry**

Investigations are under way to determine the cause of skin toughness which has been observed in some varieties after freezing.

Several varieties have been undergoing trials for adaptability.

**Strawberry**

The relative performances of 12 commercially grown varieties are discussed.

**Cranberry**

The three new varieties, Stevens, Wilcox and Beckwith (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2146), are being propagated prior to distribution. Several promising seedling selections are being observed.

An analysis of colour, acidity, pectin, ascorbic acid content, flavour and jellying properties was carried out with progeny from ten varietal crosses grown on two different bogs in New Jersey. Results showed that the fruit characters of the hybrids were influenced by the nature of the bog.

**Carrot**

A selection from Hutchinson x Emperor is better coloured and has produced a higher percentage of marketable roots than Hutchinson.

**Onion**

Promising varieties for future breeding purposes have been found among numerous specimens of *Allium Cepa* and *A. Porrum* introduced from Turkey.

Breeding work with inbred and hybrid lines was continued.

**Asparagus**

The average yield of four selected strains was 100 lb. per plot compared with 57 lb. from each of two commercially grown varieties. These new strains showed only slight yield reductions during drought. Yields are being recorded over several years before the superior material is released.

**Broccoli**

Waltham 11 and 29 proved superior to commercial varieties during the 1949 season; Waltham 11 gave a 10% increase in marketable material and Waltham 29 stood without blossoming during hot weather.

### Tomato

Although several selections from crosses of English tomatoes with Improved Bay State and Marglobe have a high degree of resistance to *Cladosporium* leaf mould, the fruit quality compares unfavourably with Improved Bay State.

Selection for immunity to leaf mould combined with commercially acceptable fruit quality is in progress in the  $F_3$  of the hybrid 44B292 x Improved Bay State (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2167).

Waltham Forcing x Michigan State Forcing is recommended to growers requiring an  $F_1$  hybrid which produces a high percentage of grade 1 fruit. Heavy yields of good quality fruit were obtained from the  $F_1$  of Red Cloud x Pennheart. Breeding for an improved strain of trellis tomato with greater resistance to cracking than Trellis 22 is in progress.

Experiments were undertaken to determine the extent of cross pollination effected by bumble bees in male-sterile strains.

### Sweet corn

Gold Mine (Mass. 2410-191 x C 3) has proved particularly cold resistant when C 3 is used as the male parent, as opposed to the reciprocal cross. C 12 and C 2A have also been used in the breeding programme to improve stalk stiffness, ear appearance and quality.

Hybridization is also in progress to develop an early maturing variety similar to Golden Cross Bantam. New genetical combinations of value for future breeding are expected among the progeny of the final crossing which has been effected to produce a hybrid from 16 inbreds. A few selections from the  $F_2$  of Fort Flint x Early Mass. 32 matured four days before the early maturing C 3.

197.

**Research for the farmer. 62nd Annual Report of the Agricultural Experiment Station, Rhode Island State College, Kingston 1950 :** Contrib. 763 : Pp. 37.

### Turf grass

Selections of Colonial bent, showing improved drought and disease resistance and growth characteristics, are to be increased for seed production. The velvet bent strain B-11 maintained its superiority in turf formation and disease resistance; commercial distribution of seed of this strain is to be undertaken. Arlington gave the best results among the creeping bent strains but exhibited susceptibility to dollar spot.

### Lucerne

The new variety Narragansett continued to give good results (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1908).

### Musk melon and cucumber

Hybrids were selected for resistance to downy mildew. An andromonecious form of the cucumber Marketer gives a heavy fruit set, the greater proportion of which consists of conveniently small fruits.

### Tomato

In breeding for early ripening and resistance to fruit cracking, the following crosses, now in the  $F_3$ , show promise: Red Cloud x Bestal, Victor x Bestal, Stokesdale x Maine 85 [Earliana x Valiant ( $F_6$ )] x BCP, and [Danmark x Stokesdale ( $F_4$ )] x 222.

### Egg plant

New Hampshire Hybrid and the  $F_1$  of New Hampshire Hybrid x New York Improved Spine outyielded BPI 161 and Early Long Purple. Breeding for resistance to *Phomopsis* blight is in progress.

198.

**Science and the land. 71st Annual Report of the New Jersey Agricultural Experiment Station 1949-50 :** Pp. 167.

### Maize

The recently released hybrid NJ 7 (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 156) has largely replaced US 13 in central and southern Jersey.

### Forage legumes

Lucerne selection for vigour at early plant stages is giving encouraging results. Plants selected at the age of 6 to 8 weeks have produced a 20% higher average yield from two years' growth than the controls. Wilt resistant selections are being obtained from Atlantic.

Variation between strains and between individual plants of Alsike clover offers scope for selection (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1923).

### Apple

Crosses have been made to develop larger fruited, scab resistant apples.

### Pear

Breeding for fire blight resistance is in progress.

### Peach

A new variety has been named Envoy, in cooperation with the Vineland Horticulture Experiment Station, Ontario. A freestone type with tender yellow flesh, Envoy ripens shortly after Golden Jubilee and at about the same



time at Triogem. Breeding for resistance to bacterial spot is in progress.

### **Blueberry**

New selections developed in cooperation with the US Department of Agriculture are being evaluated.

### **Strawberry**

Selection of hybrid seedlings is being carried out.

### **Rhubarb**

Seedling 134, from the cross between MacDonald and Sutton's Seedless, is outstanding for its vigour and productiveness.

### **Tomato**

The new variety Queens, bred from a cross between Valiant and Rutgers, is to be released (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1420).

### **Sweet corn**

All the experimental hybrids exhibited a high degree of wilt resistance.

199. TAGGART, W. G.  
**Research in Agriculture. Annual Report of the Louisiana Agricultural Experiment Station 1949-50** : Pp. 192.

### **Oats**

The reactions of recent selections and commercial varieties to crown rust and *Helminthosporium* blight have been recorded. Selections from Alber appear most promising.

### **Maize**

Results of varietal trials are reported from different parts of the state.

### **Rice**

Trials of new varieties and selections (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 159) have continued.

### **Forage grasses**

Hardy varieties which can be used for winter grazing are being sought among strains of ryegrass and tall fescue. A recently developed strain of the latter from Kentucky, named Glasgow, appears to be better adapted than either Kentucky 31 or Alta.

Strains of summer grasses are undergoing trial for their ability to withstand light frosts.

The value of native Dallis grass (*Paspalum dilatatum*) as a source of material for selection of improved strains is emphasized. Two superior strains in respect of seed quality and forage yield, developed by selection from native material, are soon to be released. Further selection within such strains is being continued for additional improvement in seed viability.

An estimation of the percentage of Dallis grass florets which develop seed has revealed significant variation in fertility. It is hoped that

more information will be obtained by analysis of the progeny of individual plants in strains originating from a single plant selection.

### **Leguminous forage plants**

Nine varieties of *Trifolium incarnatum* are being evaluated for reseeding ability; forage and seed yields were also compared.

A new variety of *T. repens*, designated Synthetic 1, has been developed by combining selected clonal lines from native stocks (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 159). It produces higher yields of forage than Ladino.

Further efforts are being made to breed varieties with even more heat resistance than Synthetic 1. *Vicia villosa* and *V. atropurpurea* are resistant to an as yet unidentified species of *Colletotrichum* causing anthracnose of common vetch. Other species of *Vicia* and most commercial pea varieties show susceptibility to the disease in greenhouse tests.

Information is given on the comparative susceptibility of varieties of lespedeza to southern blight (*Sclerotium Rolfsii*).

### **Potato**

Varietal trials at widely scattered localities indicate that DeSoto and LaSoda give better yields than Triumph and are of superior quality.

### **Sweet potato**

An analysis of the fertility of numerous lines used for breeding purposes has shown that certain plants make better female parents and others are superior as pollen producers. Controlled crosses based on this information have greatly increased the production of seed. Numerous selections on the bases of skin and flesh colour and potential yielding ability were made from first year seedlings.

Varieties were found to differ significantly in rooting capacity at different temperatures; this suggests that each variety may have an optimum rooting temperature.

Yield data on several promising seedlings and commercial varieties show that Heartogold, L-240 and Unit 1 are best suited to south-western Louisiana while L-240 and Queen Mary gave highest yields in northern areas.

### **Cotton**

Detailed reports of trials of commercial varieties and advanced and new strains in widely scattered regions are available. Deltapine 15, Fox and Plains gave consistently high yields throughout the state. Several new strains show promise of high yielding capacity.

### **Sugar cane**

Yield tests of commercial varieties and new seedlings are reported. Of the varieties tested

for reaction to red rot, CP 44/101, 44/155, 43/47, 36/105, 36/183 and 36/13 are resistant.

### **Strawberry**

The seedling L-27 continues to outyield other varieties at Hammond but Marion Bell and Klonmore are most widely grown because L-27 produces relatively few new plants per year.

### **Allium**

Attempts are being made to improve the Creole onion variety by hybridization, by increasing its resistance to thrips and downy mildew, and by raising the percentage of soluble solids to enhance its keeping quality. Seed is only being increased in lines with 19% or more soluble solids. Selections showing some resistance to downy mildew have been made from progenies of crosses with Caldred, a mildew resistant variety from California.

A cytological investigation of the nature of sterility in garlic is under way.

Varieties of shallot with resistance to yellow dwarf virus, mildew and pink root are being sought from material including fertile colchicine-induced amphidiploids derived from crosses between the common shallot and the disease resistant Nabuka onion (*Allium fistulosum*). A series of back crosses has been made to incorporate more desirable shallot characters into the disease resistant progeny.

### **Water melon**

At Calhoun a wilt resistant seedling of high quality, resembling the Black Diamond variety, has been developed.

### **Tomato**

Selections were made from hybrid lines and established varieties in an attempt to obtain varieties resistant to *Fusarium* wilt.

### **Beans**

Many more promising selections of Lima bean have been made (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 159). Selection L 39-11F is being increased for release under the name Easyshell.

The pole bean varieties Green Savage and Canfreezer (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 29) have outyielded other standard types throughout Louisiana.

### **Sweet corn**

In varietal trials for yielding ability, freedom from ear worm damage, general appearance and fresh quality, Golden Security, Aristogold Bantam Evergreen and Selection KVF 47-10 were superior.

Additional tests of flavour and texture after canning or freezing for seven months showed that Aristogold Bantam Evergreen and

Selection KVF 47-10 are preferable; Golden Security was rated only fair.

### 200. **RUSK, H. P.**

**Research work at the Illinois Agricultural Experiment Station. Report for July 1, 1948-June 30, 1950 (1951) :**  
Pp. 104.

In addition to the work summarized below, new varieties of wheat, strawberry, tomato, Lima bean, soya bean and sweet corn were released during the two-year period.

### **Fungi**

It has been demonstrated that strains with resistance to chemicals used in fruit sprays can arise by mutation in pathogenic species.

### **Wheat**

Analyses of several generations of bulked hybrid progenies from crosses between Rex x Prairie, Rex x Fulcaster and Rex x Fulhard were undertaken to determine the effect of natural selection on the proportion of certain morphological types. The populations segregating for awned and awnless spikes showed an increase of awned types with each generation; the number of average heads per plant decreased but the yield per plant approached that of the high yielding parent.

Eleven winter varieties differing by 18 days in date of heading were studied to assess the effect of time of heading on certain plant characteristics. There was a significant positive correlation between earliness and the number of spikelets per spike; positive correlations were also found between date of heading and the number of internodes, plant height and length of spike. The wheats differed by 12 days in the period between emergence of the first and last heads on a plant, although the variety taking the shortest time had approximately the same number of ears as the one with the longest heading period.

### **Oats**

Selections with improved resistance to race 45 of crown rust have been made among progenies of crosses between numerous varieties, including Clinton x Columbia.

### **Maize**

Evidence has been obtained of the heterogeneity of factors determining the number of kernel rows in several inbred lines of dent maize.

### **Forage legumes**

Seedlings produced by the few plants of Dollard red clover surviving after inoculation with *Colletotrichum Trifolii* proved more resistant to southern anthracnose than the original variety.



**Apple**

Selection has continued for resistance to scab (*Venturia inaequalis*). Several promising seedlings have been obtained, including an early maturing strain of good quality with a high degree of resistance.

Differences in the skin colour of Golden Delicious and Yellow Transparent during maturation are due to an increase in the carotenoids of Golden Delicious, whereas the carotenoid content of Yellow Transparent decreases; a reduction in chlorophyll content of both varieties occurs.

**Peach**

Selections maturing 2-3 weeks before Red Bird are undergoing further tests. Genetical studies have been concerned with fruit quality and hardiness of flower buds.

**Soya bean**

Inheritance of cotyledon colour has been investigated; evidence is given for the interaction of different genes for chlorophyll deficiency and for the number, size and distribution of chloroplasts. Linkage was detected between genes determining seed coat characteristics and pod colour.

Progenies of six crosses between four varieties were analysed in respect of the inheritance of plant height, number of nodes, number of pods borne at each node, number of seeds per pod, seed size and percentage of aborted seeds. Inheritance appeared to be polygenic for all characters except seed abortion.

201. RUSK, H. P.

**Progress in solving farm problems of Illinois. Report of the 61st year of the Illinois Agricultural Experiment Station July 1, 1947-June 30, 1948 (1950) : Pp. 224.**

In addition to the work summarized below, varietal trials of barley, sorghum, lucerne, onion, cucumber, tomato, soya bean and sweet corn have been undertaken.

**Wheat**

The release of Royal (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 205) is reported. Data are presented concerning yield trials of spring and winter wheats in different regions.

**Oats**

Early maturing strains with straw as stiff as that of Clinton are being sought among the progenies of Clinton x Columbia and Clinton x Marion. Varieties recommended for each oat-growing region are listed.

**Maize**

An increased oil and protein content has been developed in six widely grown inbreds by crossing

with Illinois High Oil and Illinois High Protein strains, followed by extensive back-crossing and selfing. Trials are in progress to determine the yielding capacity of the new lines.

Preliminary results of test crosses using 300 selected ears indicate that ear-to-hill selection is more efficient than the ear-to-row method. Analyses of the percentage of large flat kernels produced in single crosses showed that K 201 is a more desirable female parent than K 4; 65% of the seed of K 201 x 38-11 was graded as large flat compared with only 5% of the same grade from K 4 x 38-11.

Experiments have shown that the degree of husk protection is one of the main factors influencing ear rot infection by *Gibberella Zeae*, *Fusarium moniliforme*, *Diplodia Zeae* and *Nigrospora Oryzae* (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1841).

High yielding hybrids are recommended for each of the maize growing localities of Illinois.

**Brome grass**

Southern strains, such as Elsberry and Kansas, and the intermediate bromes, Lincoln, University and Fischer, have outyielded Canadian Parkland and Northern at Urbana and Brownstown. Livestock, however, appear to find northern brome grasses more palatable than either southern or intermediate strains.

**Ricinus**

Results of trials have shown that Conner and Illinois 1, a selection from Kansas Common, are best adapted to local conditions. Breeding is in progress for varieties which can be harvested mechanically.

**Sunflower**

Several inbreds with a low growth habit suitable for combine harvesting are being compared with Advance and Illinois Common, both of which are well adapted to local conditions.

**Apple**

Selections made from numerous species and hybrids in cooperation with Purdue University Agricultural Experiment Station have shown a high degree of resistance to scab (*Venturia inaequalis*); resistance was transmitted to their offspring. Several scab resistant crabs have been crossed with susceptible commercial varieties, including Jonathan, Delicious and Wealthy, which are known to produce progeny with high quality fruit.

**Peach**

F<sub>2</sub> seedlings from Heath x Marigold showed wide variation in respect of date of maturity and quality of flesh and juice. The best of six seedlings, selected for further trial on the basis of fruit quality, matures particularly early.

### Soft fruits

Analyses of sugar and acid content in numerous varieties of strawberry and raspberry have been made. It is hoped that the information, which is related to quality differences, will be applied to the selection of plants for hybridization.

202. HARDIN, C. M.  
**Sixty-Third Annual Report of the Agricultural Experiment Station of Michigan State College for the year ended June 30, 1950.**  
Bull. Mich. St. Coll. 1951 : 45 : No. 25 : 167-85.

Breeding and other projects in progress are listed. The following work is referred to in detail:—

#### Maize

Michigan 267 and Michigan 381 have shown promise in extensive trials; it is expected that they will be released in 1951.

#### Peach

Fairhaven is giving satisfactory commercial results (cf. *Plant Breeding Abstracts*, Vol. XVII Abst. 844).

#### Celery

In trials on muck soil, several varieties of green celery exhibited promising characteristics. Consumer preference is shifting to this type.

203. JOHNSON, I. B.  
**Agricultural research in South Dakota. Sixty-second Annual Report of the South Dakota Agricultural Experiment Station July 1, 1948 to June 30, 1949 : Pp. 91.**

#### Wheat

Efforts are being made to increase the hardiness of winter wheat by intergeneric and inter-specific hybridization, bulk crosses and back crosses. Extensive back-crossing is in progress to improve the drought, disease and grasshopper resistance of spring wheat.

#### Oats

Numerous selections are being tested for disease resistance.

#### Rye

Yield increases are being sought by selection followed by recombination of superior types. Release of a promising new winter hardy variety with good yielding ability is forecast (cf. Abst. 326).

#### Maize

Breeding work has continued (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2176); although no new releases have been made several promising hybrids have been developed.

### Barley

The breeding programme involves the use of back crosses and bulk crosses in an attempt to improve earliness, yield, standing ability and resistance to drought, insects and diseases.

#### Flax

Many selections are being tested in cooperation with the US Department of Agriculture. One strain has given outstanding fibre yields of good quality and also produces high quality oil; it is well adapted to north-eastern South Dakota.

#### Sorghum

Numerous strains of grain and forage types produced within and outside the state are undergoing tests for adaptability, earliness, yield and quality.

Considerable changes in plant height, growth, form, date of maturity, seed size and foliage colour appear to have been produced in 150 lines of grain sorghum treated with colchicine. Further studies are in progress.

#### Forage grasses

Plant selections and seed from long-established fields of brome and crested wheatgrass are being grown under observation. It is hoped that improved strains will be developed by selection from progenies derived from controlled pollinations.

#### Forage legumes

Naturalized stands of hybrid lucerne are being used to study the relationship of hardiness and survival with degree of hybridization, habit of growth and morphological characters. Over 2000 plants from open-pollinated seed have been established at the Range Field Station, Cottonwood, where their degree of hardiness can be evaluated under extreme conditions. New strains of lucerne and clovers developed by other states are undergoing trial for adaptability.

#### Potato

Selections made previously (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2176) have continued to show resistance to scab under severe artificially induced epidemic conditions.

#### Fruit

Pollen obtained from other stations is being stored in refrigerators until needed, thus dispensing with the maintenance of a greenhouse tub-orchard for crossing purposes only. Madawaska raspberry has outyielded all other varieties in the state and has survived winter conditions at Brookings for the last two years.

#### Tomato

Hybrids producing large yields of good quality have been developed; these are undergoing adaptability tests in different parts of the state.



**Sweet corn**

Some high quality hybrids developed by the station are to be released shortly.

204.

**Agricultural research in South Dakota. Sixty-third Annual Station Report of the Agricultural Experiment Station, July 1, 1949 to June 30, 1950. Pp. 139.**

The first 100 pages of this report comprise the year's quarterly issues of *South Dakota Farm and Home Research*. Subsequent pages provide a brief supplement to the major research results.

**Wheat**

All commonly grown varieties are susceptible to the virus causing a newly discovered mosaic. Spring wheats, particularly durum varieties, are more susceptible than winter wheats. A few strains from western Asia show some degree of resistance.

Numerous wheats from Turkey and India are being tested for resistance to leaf rust. Some varieties appear to be resistant to several strains prevalent in South Dakota; further trials are in progress.

**Oats**

The characteristics of James hull-less oats are described (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 992).

**Maize**

Production of hybrids continues and numerous yield trials are in progress. South Dakota 270, developed from a double cross between two local inbreds and two from other states, has been released. It matures later than South Dakota 224 but outyields that variety.

Strains with a high degree of resistance to root rot are being sought among numerous indigenous lines and introductions from Guatemala.

**Barley**

Analyses of protein content have shown that varieties differ widely in percentage of hordein and glutelin. Further investigations are to be undertaken to determine the relationship between protein content and varietal adaptation to malting.

**Sorghum**

Considerable variation in rate of germination at 45° F observed among 62 strains of grain sorghum indicates the possibility of selecting types which can be planted early in cold soils; subsequent early maturity would facilitate drying and improve the storage quality of the grain.

The development and release of Norghum, an early variety, is reported (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1656).

**Forage grasses**

The superiority of native strains of brome grass has again been demonstrated in trials of strains from many sources; crosses between the best plants were carried out to determine desirable combinations from which selections will be made. There appears to be no selection pressure exerted against forage production by selection for high seed yields. A cytological study of accessory chromosomes in *Bromus* is in progress.

The possibility of crossing rye with wild rye from Russia is being investigated.

Progenies of selected *Agropyron* clones are undergoing observations for combining ability.

**Forage legumes**

Breeding work with lucerne has been continued. Numerous introductions from other American states and Canada are undergoing adaptability trials.

Several large-seeded species of *Melilotus* are being increased prior to hybridization with small-seeded forms well suited to local conditions.

Eight lines of *Lotus corniculatus* with a high degree of cold resistance have been selected from open-pollinated material for further trial.

**Potato**

Further selections have been made among scab resistant lines.

**Tree fruits**

Several seedling apples have fruited for the first time; a number have been selected for further observation. Plants involved in the production of triploid apples are to be crossed with commercial varieties of high quality. Twenty apple varieties from Russia are being evaluated for breeding purposes.

A new winter hardy apricot selected from a Siberian introduction has been released as Sunshine. A sand cherry x plum hybrid has been named Honeydew.

**Strawberry**

Varieties appear to differ widely in vitamin C content. It was found that fruits shaded by leaves have very low ascorbic acid content; consequently the fruits of varieties with long flowering axes contain more vitamin C. With the exception of Aberdeen, which always has a low vitamin C content, there was little difference in the amount of ascorbic acid in fruits of eight commonly grown varieties exposed to full sunlight.

**Populus**

Increased resistance to *Melampsora Medusae* has been observed among selected cottonwood

clonal lines and hybrids (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2176).

### **Ulmus**

Strong fast-growing hybrids, suitable for shelter belts, have been selected from seedling progenies produced by adjacent rows of *U. fulva* and *U. parvifolia*.

### **Tomato**

Performance tests carried out in various localities over three years have shown that South Dakota Hybrid 2 grows well throughout the state. It is an early maturing variety which gives a high total yield of medium-sized fruit suitable for canning.

Selections showing a high degree of resistance to *Septoria Lycopersici* have been made from the offspring of numerous cultivated lines crossed with wild species.

### **Soya bean**

Varietal trials have been conducted, in cooperation with the Regional Soybean Laboratory, with respect to yielding ability, date of maturity, lodging, plant height, seed size and quality and shattering tendency.

### **Sweet corn**

Breeding work involves selection of desirable inbred lines, hybridization and subsequent evaluation of  $F_1$  hybrids. A Bantam inbred line, designated 176, produces vigorous hybrids of good quality in many combinations and transmits some degree of smut resistance.

205. HILL, J. A. and  
JENNY, G.

**Sixtieth Annual Report of the Wyoming Agricultural Experiment Station 1949-50 : Pp. 56.**

### **Wheat**

The selection Hope-Timstein 1129-49 had only a trace of leaf rust in test plots, whereas Marquis showed 80% infection. Several selections from the US Department of Agriculture were free from rust.

### **Oats**

The disease resistant variety Cody was released (cf. Abst. 307).

### **Lucerne**

Varietal trials have shown that Atlantic and Meeker Baltic are the highest yielding varieties where wilt is no problem or where lucerne is in short rotation. Ladak, which possesses some wilt resistance, gives good yields in areas where only two cuts are made. Ranger, Buffalo and Turkestan are highly resistant to wilt.

### **Potato**

Promising seedlings have been selected.

### **Beans**

Resistance to root rot is being sought. Breeding for resistance to bacterial blight is in progress.

206.

**63rd Annual Report of the Colorado Agricultural Experiment Station 1949-50 : Pp. 59.**

### **Wheat**

Progress is being made in breeding for rust and bunt resistance. In view of the epidemic of dwarf bunt in north-western Colorado during 1949, breeding to combine good milling quality and resistance to this disease has been initiated.

### **Maize**

Hybrid production continued. Experimental double hybrids have been obtained which show promise for irrigated conditions in Colorado, particularly in the Arkansas Valley; the most productive of these hybrids yielded 16% more than the standard Hybrid 322.

### **Barley**

Inheritance of short straw is under investigation. Semidwarf types from Japan are being used in developing short strawed, high yielding barleys. The new variety Otis (Munsing x Spartan) was released for growing without irrigation. Breeding for resistance to loose smut and rust continued.

### **Lucerne**

The seed setting capacity and bacterial wilt resistance of Hardistan are being improved. In an attempt to increase the wilt resistance of Meeker Baltic, two methods are being followed: (1) repeated selection of open-pollinated material and (2) inbreeding and polycrossing of  $S_2$  lines.

### **Onion**

A disease resistant onion of the Sweet Spanish type is being sought. Several hybrids between inbred lines show promise.

### **Beans**

Introductions obtained from the US Department of Agriculture are being tested for rust resistance to obtain breeding material. Pinto bean selection for rust resistance and haulm type has been effected. Bean strains reported to be resistant to curly top virus are being subjected to greenhouse tests.

207.

**Research for New Mexico agriculture. 60th Annual Report of the New Mexico Agricultural Experiment Station for the fiscal year ending June 30, 1949 : Pp. 56.**

### **Wheat**

Turkey 60 has produced higher yields than other winter varieties on the light soils of the



Middle Rio Grande substation, although it was more susceptible to lodging and matured later than Wichita, Comanche, Westar and Triumph. Winter wheat trials are in progress at the Plains substation.

### Maize

In hybrid maize trials at the Middle Rio Grande substation, Funk's G 80 has given consistently high yields since 1945 and still remains superior in this respect.

### Barley

The standard variety, New Mexico Winter, has continued to outyield other barleys; of 35 varieties tested, only Cascade appeared promising in comparison.

### Sorghum

Milo 7078 has proved superior to other combine sorghums in yield tests. It shares with Double Dwarf Yellow Sooner the highest average yield over three years. In the Middle Rio Grande area Martin and Midland show greater adaptability than either of the above varieties.

Sedan Kafir has averaged 17 bushels per acre during a three year period.

In forage sorghum trials, Leoti Red continues to outyield other varieties, but at the North-eastern substation Sumac has produced high yields of good quality forage.

### Lucerne

Combined resistance to *Fusarium* and bacterial wilts is being sought; the highest degree of resistance has been found in progeny of New Mexico 5-88-0.

The results of yield trials with six commercially grown varieties are reported. In the third year of a test comparing 70 new strains of lucerne from different states, 7 locally developed strains have given highest yields. Plants producing vigorous early spring growth are generally high yielding.

In the Middle Rio Grande area, New Mexico Common and Ranger made abundant early spring growth and recovered more rapidly than other varieties after cutting.

### Cotton

A new strain, 7133, has yielded 45% more lint per acre than the standard 1517 B at the first picking; the total yield from 7133 exceeded that from 1517 B by 37%.

Varietal trials have continued.

### Sugar beet

Nine varieties and strains developed by the US Department of Agriculture have been tested for curly top resistance. The most resistant strain was SL 61, which produced 12.8 tons per acre.

### Chilli

Among the new strains developed in an attempt to improve chilli production in southern New Mexico, strain 6 has given an outstanding performance. It matures slightly earlier than College 9, which it outyields by at least 25%, and produces comparatively smooth, long, fleshy pods suitable for canning or other forms of processing. Its vigorous early growth may be responsible for its high degree of resistance to diseases prevalent in the area; these include western yellow blight and a *Phytophthora-Fusarium* complex causing wilt. Strain 6 is to undergo further trials.

### Pecan

The percentage kernel was below average in all but 2 of 21 varieties undergoing trial.

### Groundnut

In yield trials at the North-eastern substation, Spanish and its improved strains have proved to be well adapted to the area.

### Grape

Numerous American, European and muscadine types were planted in 1947 to test their adaptability to local conditions. Although the American varieties are more susceptible to chlorosis, 98.4% have survived, whereas 21.5% of the European grapes and almost all of the muscadine varieties have died.

### Beans

Improved strains of pinto bean include 295, 641, 2659 and 2574. The latter has a low tenderness index which indicates good cooking quality.

On light soils of poor fertility Dortchsoy 7 has resisted shattering and outyielded other soya beans undergoing tests.

208.

**Agricultural research in Idaho. Fifty-Seventh Annual Report of the University of Idaho Agricultural Experiment Station for the year ending June 30, 1950 :** Bull. No. 280 : Pp. 73.

### Wheat

Several Japanese varieties possessing winter hardiness are undergoing adaptability trials.

### Barley

The characteristics of Idaho Club (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1853) are outlined. Numerous varieties of Japanese origin are being observed for resistance to winter killing.

### Forage grass

Intermediate wheat grass (*Agropyron intermedium*), introduced from Russia by the US

Department of Agriculture, grows vigorously in Idaho and remains green 2-3 weeks longer than other forage grasses. It has the same moisture requirements as smooth brome grass and shows promise as a hay type, particularly when mixed with lucerne.

### **Carrot**

A new short-topped variety with roots averaging an inch longer than *Imperator* has been named *Imperida* (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 683). It originated from a chance crossing between *Imperator* and *Red Core Chantenay*, with subsequent selection and inbreeding. The short tops will eliminate some of the difficulties of packing to retain an attractive marketable condition.

### **Potato**

Several thousand seedlings are being grown at Aberdeen and Rexburg, in conjunction with the US Department of Agriculture, to obtain strains resistant to leaf roll and *Verticillium* wilt.

### **Tomato**

Cytogenetic studies to determine the inheritance of curly top resistance in interspecific crosses are being continued.

Early Chatham is recommended as an early tomato for the garden. Other varieties, suitable for canning and general use, have shown promise during trials at Lewiston where Sioux has been outstanding in performance over four years.

### **Bean**

Twelve snap bean selections showing promise for processing are to be grown in seven eastern states where they will be compared with standard varieties.

### **Sweet corn**

The yielding capacity and quality of numerous commercially grown varieties have been studied in an attempt to find one adapted to local conditions but earlier maturing than *Golden Cross Bantam*, the principal processing variety grown in Idaho.

209.

## **Second Annual Report of the Commonwealth Scientific and Industrial Research Organization for the year ending 30th June, 1950 : Pp. 157.**

In addition to the work referred to below, the results of adaptability trials in different parts of Australia with introductions of forage and other crops from 41 countries are reported.

### **Forage legumes**

In a two years' trial of subterranean clover at Armidale, NSW, Tallrook has outyielded three

other strains. A number of promising selections have been made at Glen Lossie, Western Australia.

### **Potato**

Inheritance of resistance to the viruses causing leaf roll and spotted wilt is being investigated. The progress of an experiment to determine the relative rate at which virus X spreads in plots of five varieties is reported.

An attempt is being made to induce the recovery of cultured potato tissues infected with virus X. This experiment forms part of a series of investigations concerning the ability to recover from virus infections. If recovery is possible, it is hoped that FX stocks will be obtained from many varieties already infected.

Field trials for varietal resistance to *Actinomyces scabies* have been continued. Further experimental results have confirmed that *Medium Brownell* and *CPC 1417* possess slight resistance to preemergence sprout injury by *Rhizoctonia Solani*; this resistance is too slight to be useful for breeding purposes. Hybrids from Canada and Scotland, with reputed resistance to *Phytophthora infestans*, proved highly resistant to five isolates from Tasmania, Victoria and New South Wales during tests at Canberra. Only minute black specks appeared on the foliage; these were due to a hypersensitive reaction. Resistant hybrids are to be crossed with susceptible Australian varieties of otherwise desirable quality.

### **Tobacco**

Mosaic resistance is being incorporated in several flue-cured varieties of good quality by crossing with material derived from *Nicotiana glutinosa*. It is hoped that resistant seedlings from the third back cross to commercial varieties will be of acceptable quality.

### **Opium poppy**

Improved hybrids combining the desirable characteristics of promising varieties have yielded 50% more morphine per acre than the variety grown commercially during the last world war. Seed stocks of selected improved lines are being increased prior to storage.

### **Sunflower**

A study of the factors controlling the mechanism of flowering and seed setting is in progress.

### **Safflower**

Investigations have been made concerning the inheritance of the spineless character.

### **Duboisia**

Selections are being made from progenies of interspecific and intraspecific crosses involving *D. myoporoides* and *D. Leichhardtii* to obtain



improved yields of hyoscyne and atropine. Observations at Canberra have disclosed genotypes determining resistance to low temperatures in both species.

Both hyoscyne and hyoscyamine were formed in tomato scions grafted on *D. myoporoides* stocks. Further investigations of alkaloid synthesis are under way.

### Apple

Interfertility experiments have confirmed that both Jonathan and Granny Smith are suitable pollinators for Delicious, which must be cross-pollinated.

### Peach

Storage qualities of several new varieties grown on the Bathurst Experimental Farm, NSW, have been determined.

Blackburn, Elberta Late and Elberta Cling proved to be outstanding for canning during the 1949 season.

### Tomato

A high degree of resistance to spotted wilt virus, associated with a selection of *Lycopersicon pimpinellifolium*, has been inherited by hybrids with commercial varieties. Numerous back crosses have been carried out to improve fruit size and quality.

A new technique for testing reaction to *Alternaria Solani* has failed to reveal any resistance to defoliation in numerous varieties and strains of *L. esculentum*, *L. pimpinellifolium*, *L. peruvianum* and *L. hirsutum*.

Inheritance of resistance to root knot nematode is being studied at Mildura.

### Bean

Selections possessing a high degree of resistance to angular leaf spot (*Isariopsis griseola*) have been obtained.

### Pea

The relative resistance of Austrian Winter, Greenfeast and William Massey to *Ascochyta Pisi* has been determined. Resistance appears to lessen with increasing maturity. Strains with resistance to bacterial blight (*Pseudomonas pisi*) are being sought.

210. MACINDOE, S. L.  
**Contributions of agricultural research in crops.—1. Cereals.**  
 J. Aust. Inst. Agric. Sci. 1951 : 17 : 67-76.

A review is given of progress made in Australia during the last 50 years in breeding improved varieties of wheat, oats, maize, barley, sorghum

and rice. The development of varieties of flax and linseed is also outlined.

211. SUMMERVILLE, W. A. T.  
**Contributions of agricultural research in crops.—5. Warm climate crops.**  
 J. Aust. Inst. Agric. Sci. 1951 : 17 : 85-89.

The improvements in cotton, sugar cane, tobacco and groundnut crops grown commercially in Australia during the past 50 years are briefly surveyed, with emphasis on the development of new varieties and strain selection.

212. MILES, L. G.  
**The relationship of crops to dry farming practice in Queensland.**  
 Qd. Agric. J. 1951 : 73 : 97-108.

A general survey is given of the development of cereal, forage legume, cotton, linseed and sunflower varieties suited to regions experiencing only summer and autumn rainfall.

213. MORROW, J. A.  
**An outline of the development of Victorian crops and pastures. 100 years of progress.**  
 J. Dep. Agric. Vict. 1951 : 49 : 299-314.

Progress made in the production of wheat, forage grasses and legumes, potatoes, flax, sugar beet and tobacco suited to conditions in Victoria is summarized.

214. BUSTARRET, J.  
 Les recherches de génétique végétale et d'amélioration des plantes dans le cadre de l'Institut National de la Recherche Agronomique. (**Research on plant genetics and plant breeding under the National Institute of Agronomic Research**).  
 Ann. Inst. Nat. Rech. Agron., Paris 1951 : Sér. B. : 1 : 3-8.

The development and organization of research on plant breeding in France is outlined, with a list of various laboratories, stations and centres officially charged with the tasks of breeding agricultural and horticultural crops. Plant breeding is defined with reference to its scope and its relations to allied sciences and a summary is given of the crops that have been studied at the above institutions during the past 15 years.

215. FRANDSEN, K. J.  
Forædling af fremmedbefrugtere. Resultater og Erfaringer fra Forædlingsarbejdet med fremmedbefrugtende Planter. (**Breeding cross-fertilized plants. Results and findings from breeding work with cross-fertilized plants**).  
Nord. JordbrForskn. 1949-50 : No. 3-4 : 233-53.

Having exemplified the part that has been played by breeding in increasing production in fodder plants, the writer gives a documented account of the following methods used in breeding cross-pollinated plants: selection of individuals by artificial or by natural selection; multiplication of families or lines; and strain building (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 39). Many of the results cited were obtained by Scandinavian or Finnish breeders and have already been summarized in *Plant Breeding Abstracts*. In conclusion various possibilities in regard to the improvement of yields and quality are considered, special mention being made of the results of recent research on heterosis, disease resistance, adaptation, combinability, nitrogen manuring and the breeding of plant types capable of utilizing a greater supply of nutrients.

216. HARLAN, J. R.  
**Anatomy of gene centers.**  
Amer. Nat. 1951 : 85 : 97-103.

As a result of observations on crops in Turkey the author concludes that the broad centres of origin postulated by Vavilov contain areas where the number of varieties is relatively low and others in which varieties occur in abundance. The latter are referred to as microcentres. The microcentres of a number of crops frequently coincide. Such centres may be situated on the plains or in mountainous regions; they may be near or remote from civilization; husbandry may be very primitive or moderately advanced. In all microcentres, evolution is proceeding at a rapid rate at the present time.

217. **The Annual Report of the Fruit and Vegetable Preservation Research Station, Campden 1950 : Pp. 20.**

Varieties of apple, plum, raspberry, blackberry, black currant, gooseberry, strawberry, bean and pea best suited to canning and quick freezing are listed.

218. **Special seed imports and exports by Natural Resources Section.**  
Wkly. Summ. Natural Resources Sect. Gen. Hdqrs. Allied Powers, Japan 1951 : No. 289 : 7-11. (Mimeographed).

Information is given on the recent introduction of cereal and other crop varieties from the USA into Japan, for testing, immediate use or breeding.

219. MURTY, G. S.  
**Symposium on the "Origin and distribution of cultivated plants in South Asia".**  
Science 1951 : 113 : 703-04.

An account is given of the above symposium, held in Delhi during January 1951, and organized by the Indian Society of Genetics and Plant Breeding in cooperation with UNESCO. S. C. Harland, E. Anderson and A. Müntzing spoke of the fundamental problems of the origin of cultivated plants. Among the topics raised in the discussions were: the probable centres of origin of rice, sugar cane, egg plant, *Corchorus capsularis*, mango, banana, orange and lemon in Asia; wheat breeding for combined resistance to rusts in India; millet breeding in progress at Coimbatore; and the view that *Gossypium arboreum* originated from the African species *G. anomalum*. Final proposals included the following. (1) Plant introduction should be made from areas having similar climatic or environmental conditions; introduction into South Asia from Mexico, Peru and Guatemala should therefore be considered. (2) Appropriate national or international organizations should be set up to explore South Asia for economic and related wild plants. (3) Cytogenetical and physiological investigations of all cultivated plants and related wild forms should be undertaken. (4) Herbaria of races and varieties of crops should be established at breeding centres, for the advancement of taxonomy.

220. HAGEL, G.  
Über die Wirkung von Digitalis und anderen Glykosiden auf die Keimung und das Wachstum von Pflanzen. (**On the effect of digitalis and other glucosides on the germination and growth of plants**).  
Züchter 1951 : 21 : 138-42.

Fahrenkamp has maintained that pretreatment with digitalis and other glucosides used in heart therapy to cause swelling of seeds results in a higher percentage of germination, promotes



growth of the embryo, and increases yield. The results of investigations using cucumbers, lettuce, peas, soya bean, beet and lupin, have led the author to the conclusion that Fahrenkamp's claims are unfounded and that there is no possibility of increasing crop yields by the use of digitalis.

221. YOUNG, P. A. and  
WATKINS, G. M.

**History of plant disease research in Texas.**

Plant Dis. Reporter 1951: Suppl. No. 200: 30-35. (Mimeographed).

A brief account of progress made in pathological research since 1886 mentions breeding for resistance to milo disease (*Periconia circinata*) of sorghum, root rot (*Phymatotrichum omnivorum*) and bacterial blight (*Xanthomonas malvacearum*) of cotton, southern blight (*Sclerotium Rolfsii*) of groundnut, downy mildew (*Pseudoperonospora cubensis*) of cantaloupe and *Fusarium* wilt, early blight (*Phytophthora infestans*) and root knot of tomato.

222. \*MASTENBROEK, C.

Moet eerst geselecteerd worden op resistentie of eerst op opbrengst? (**Should selection for resistance or for yield be done first?**)

Studiekring voor Plantenveredeling (Plant Breeding Study Circle) 25 November 1947 Wageningen: 171-77. (Mimeographed).

This discourse dealt largely with the reasons for which breeding for disease and pest resistance and for yield may be necessary, with well-known examples relating to potatoes, cereals and sugar cane.

Ordinary yield selection is regarded as most suited for crops whose yield falls far below the maximum possible.

If selection for resistance is necessary it should be begun as early as possible, for selection based on yield alone preserves much material that must later be discarded.

- 223.

J. Nat. Inst. Agric. Bot. 1950: 5: 415-560.

Thompson, E. G. and Bell, R. A. M. *Trials of the spring barleys:—Freja, Balder, H.H.11/10 Cult 6, Rigel and Ymer in the years 1946-1949.* (pp. 417-29).

In trials at several centres in England, the above

barleys fell in the same class as the control variety Kenia. Freja has been added provisionally to the recommended list; it appears to give higher grain yields than Kenia on fertile soils and in districts where earliness is an advantage.

Earnshaw, F. *Trials of spring barley varieties Earl and Plumage-Archer 1943, 1942-1948.* (pp. 430-37).

Earl (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 2161) and Plumage-Archer 1943 were compared for several characters, with Spratt-Archer as the control.

Finch, C. G. *Variety trials of early cauliflowers, 1947 to 1950.* (pp. 438-58).

Trials were carried out at several centres to compare varieties bred by the Cambridge Horticultural Research Station with commercial varieties.

*Reports of the Potato Synonym Committee 1949 and 1950.* (pp. 483-87).

The results of examinations of material represented in wart disease immunity tests and other trials are reported.

- 224.

**Thirty-First Report and Accounts of the National Institute of Agricultural Botany 1949-50: Pp. 36.**

The chief results of varietal trials of wheat, oats, barley, rye, lucerne, mangold and fodder beet, sugar beet, potato, linseed, field pea and vegetables are presented. Multiplication of the spring barley Kenia-Plumage-Archer hybrid HB 35/99/4/10 for marketing is to be undertaken. The medium early field pea Maple PB 42 Cult. 7 has given consistently good yields during the past few years and is to be multiplied for sale. The linseeds Valuta and Dakota are recommended for commercial trial as substitutes for Royal and Redwing respectively. Trials of mangold and fodder beet carried out so far indicate that the Danish strains give higher yields of dry matter than most British mangolds (cf. Abst. 491).

Tests of varietal susceptibility of wheat to loose smut are in progress. Work on the reaction of wheat and barley varieties to races of yellow rust has been initiated.

Reports of seed multiplication work, the Seed Production Committee, and the Official Seed Testing Station for England and Wales are also given.

\* An extended summary of this paper is on file at the Bureau.

225.

**Annual Report of the Agricultural Departments of the Leeward Islands for 1949 (1951) : Pp. 14+48+40.**

Varietal trials of cotton and sugar cane have been continued. In St. Kitts, the sugar cane varieties B 34014, 41211, 41227 and 4362 gave sufficiently high yields, in comparison with the widely grown B 37161, to be recommended for certain localities.

226. COOKE, H. L.,

PEEDIN, C. D. and

MOORE, R. P.

**Measured crop performance.**

Bull. N.C. Agric. Exp. Sta. 1951 : No. 373 : Pp. 42.

A detailed report is given concerning the performance of commercially grown varieties of wheat, oats, maize, barley and cotton grown in official trials at different localities throughout North Carolina.

227.

**Report of the FAO Mission for Nicaragua.**

Food and Agriculture Organization of the United Nations, Washington 1950 : Pp. 200.

Crop production and other aspects of agriculture are surveyed. The establishment of a Central Institute of Agriculture in the vicinity of Managua is recommended; its activities should include crop introduction and the testing and demonstration of improved varieties.

## CEREALS

228. PUHALJSKIĬ, A. and

SKVORCOV, S.

**(The Šatilovo State Breeding Station).**

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 11 : 13-18. [Russian].

### Wheat

Šatilovskaja 22 is productive, hardy and resistant to lodging. It outyields the winter wheat standard Ferrugineum 1239 by 3.5 to 4 c. per ha.

A new spring wheat Šatilovskaja 1326/32 is more productive than the standard Lutescens 62. Lutescens 1 is another promising spring wheat.

### Buckwheat

The new varieties Orlovskaja 2 and 3 [Orel 2 and 3] showed promise in preliminary tests. In trials conducted at the institute, a new variety, Hybrid 307, was more productive than any other variety of buckwheat, yielding 19.6 c. per

ha. This hybrid was obtained by vegetative hybridization between buckwheat and *Fagopyrum tataricum*.

### Oats

Breeding work is in progress with Šatilovskii 56, previously bred at the institute, to improve its productiveness and resistance to drought and lodging.

229.

Rapport du Ministre de l'Agriculture de la Province de Québec pour l'année finissant le 31 Mars 1950. (Report of the Minister of Agriculture of the Province of Québec for the year ending 31 March 1950). 1950 : Pp. 158.

The Research Council has in view trials of disease resistant potatoes.

The Horticultural Service has carried out intervarietal crosses of legumes and of small fruits, including vines, at the Deschambault Provincial Farm School.

At the Agricultural Institute of Oka, variety trials of strawberries have shown Viking to be superior in quality to its competitors; and another red variety 201 from Ottawa, while possessing the qualities of Viking, is more resistant to disease.

MacDonald College has acquired a cytological laboratory for genetic studies.

230. SEFRÁNEK, B.

K novým objevům sovětské agrobiologie. (New discoveries of Soviet agrobiology).

Zem. Pokrok 1950 : 17: p. 207.

Reference is made to Soviet experiments in which one plant species changed into another or into several other varieties as a result of external conditions. The examples quoted include changes of wheat into rye, of a branching wheat into barley, oats, *Avena fatua* and winter rye, and the conversion of a cabbage into other species and botanical varieties of *Brassica* (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2204).

231. AVANZI, M. G.

Ricerche sulla poliploidia somatica nei tessuti differenziati della radice di alcune Graminaceae. (Somatic polyploidy in differentiated root tissues of some Gramineae).

Caryologia, Pisa 1950-51 : 3 : 351-69.

Roots of cereal seedlings were placed in solutions of 2,4-dichlorophenoxyacetic acid or its sodium salt for 2-4 days when they had reached a



length of 2–3 cm. In *Secale cereale*, *Hordeum vulgare*, *Triticum durum*, *T. vulgare* and, to a lesser extent, *Zea Mays*, mitoses with  $4n$  and  $8n$  were observed in the cortical tissue. In certain figures the 8 chromatids of a tetraploid chromosome could be seen still attached to the centromere, showing that polyploidy had arisen by division of the chromatids without the centromere rather than by successive endomitoses. Various chromosome aberrations were observed in the polyploid nuclei; their frequency varied in different roots but in general was greatest in *Secale* and least in *Hordeum*.

232. BROEKHUIZEN, S.

De invloed van het maaidorsen op de kwaliteit van het graan, in het bijzonder van de tarwe. (**The influence of combine harvesting on the quality of grain, especially of wheat**).

Techn. Ber. Stichting Coörd. Cult. Onderz. Broodgraan, Wageningen 1951 : No. 3 : Pp. 18. (Mimeographed).

This pamphlet contains a review of the literature on the choice of varieties for combine harvesting and the effects of this method upon the germination, colour and dry matter content of the grain and upon baking quality. The author's own experiment showed that the influence of the time of combine harvesting on baking quality is closely related to the ripeness of the grain. This may explain the conflicting views held on the value of combine harvesting. The investigation will be continued on a larger scale.

233. CEDIK-TOMAŠEVIČ, Z. F.

(**The results of experiments with interspecific mixed sowings of cereals**).

Agrobiologija (Agrobiology) 1951 : No. 1 : 109–21. [Russian].

The problem of interspecific and intraspecific competition in cereals was investigated at the Gorki Leninskije Experimental Base of the Lenin Agricultural Academy.

Experiments with the spring wheat *Lutescens* 062, grown in mixed fields with the *graecum* spring variety Moskovka [Moscow], and with an *erythrospermum* winter wheat Durable, grown together with the *alborubrum* winter wheat Kunsiku, showed that no competition occurred. Similar investigations in which a winter rye, Moskovskaja Vjatka [Moscow Vjatka], was grown intermixed with the winter wheat 2651 proved that the two species competed with each other, and that within four generations the wheat was almost entirely suppressed by the rye.

234.

**Agriculture. Research and Scholarship in the University of Sydney. A short record of original work done during 1946 and 1947 (1951) : 95–100.**

Surveys of the rusts of wheat, oats, barley, rye and grasses continued. Changes in the relative abundance of leaf and stem rust races occurred. Races of leaf rust capable of attacking the wheat Gabo have spread widely; appropriate crosses have been made with leaf rust resistant varieties. Hybrid selections and introduced cereal varieties have been tested for reaction to stem rust. Breeding for resistance to flag smut in wheat is receiving attention.

Progress has been made in studying inheritance of resistance to cereal stem and leaf rusts, particularly to the leaf rust races attacking Gabo. Back-crossing projects were continued; it is expected that valuable new varieties will be developed fairly soon.

235. TJALLEMA, H. T.

Ter inleiding. (**Introduction**).

Eerste Jaarb. Stichting Coörd. Cult. Onderz. Broodgraan 1951 : 3–5.

BROEKHUIZEN, S.

Eerste jaarverslag van de stichting Cocobro. (Verslag over 1950). [**First annual report of the Cocobro foundation (Report for 1950)**].

Ibid. 1951 : 6–19.

In the first of the above two papers an account is given of the foundation and functions of the new Dutch foundation, Cocobro [Stichting voor Coördinatie van Cultuur en Onderzoek van Broodgraan (Foundation for Coordination of the Cultivation of and Research on Bread Cereals)]. Associated bodies cooperating with Cocobro are named.

The second paper contains information on the officials and membership of Cocobro, on its endowment and on the various research problems, e.g. cold resistance, under investigation by various teams of associated groups of research workers.

## WHEAT

236. DE HAAN, H.

De tarweveredeling in Italië. (**Wheat breeding in Italy**).

Eerste Jaarb. Stichting Coörd. Cult. Onderz. Broodgraan 1951 : 94–103.

A concise account is given of the growth, development and organization of wheat breeding in Italy, with information on the main stations

and centres, their directors and the breeding methods employed. Strampelli's Ardito series of wheats is mentioned as combining the productivity and quality of European wheats, e.g. Wilhelmina, with the earliness and rust resistance of wheats from the Far East, e.g. the Japanese variety referred to as Akagomughi.

237. WÄLSTEDT, I.  
Veteförädlingen vid Sveriges Utsädesförenings Östgötafilial. (**Wheat breeding at the Östgöta Branch Station of the Swedish Seed Association**).  
Sverig. Utsädesfören. Tidskr. 1951 : 61 : 63-94.

This review deals in detail with spring and winter wheat breeding at the above station for the past 15 years up to 1949. This work has been recorded in the annual reports of the Swedish Seed Association, which are regularly reviewed in *Plant Breeding Abstracts*.

238. HANNA, W. F.,  
PETERSON, R. F. and  
ANDERSON, J. A.  
**How are new wheat varieties tested?**  
Agric. Inst. Rev., Canad. 1951 : 6 : No. 4 : 17-26.

A popular illustrated account of the procedures and organization used in testing new varieties for disease resistance, yield and quality in Canada is presented.

239. VOGEL, O. A.,  
SWENSON, S. P. and  
HOLTON, C. S.  
**Brevor and Elmar—two new winter wheats for Washington.**  
Bull. Wash. Agric. Exp. Sta. 1951 : No. 525 : Pp. 8.

The wheats Brevor and Elmar are described in detail (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1566). Brevor is a selection of a cross between Turkey-Florence x Fortyfold-Federation and (Oro x Turkey-Florence) x (Oro x Fortyfold-Federation); Elmar was developed by back-crossing the hybrid Hymar x Elgin to Elgin.

240. THOMAS, I.  
**New cereal varieties in Australia.**  
J. Agric. W. Aust. 1951 : 28 : 32-33.

The wheat Lawrence is recommended for Queensland; it is late maturing, tall, with fine white straw, highly resistant to leaf and stem rust, suitable as a dual purpose variety and has good loaf volume. It was selected from a cross between Florence x College; since the cross was

made College has been almost definitely identified as Hope.

The wheat Macquarie, selected from a cross between Sutton and Braemar Velvet at the Cressy Research Farm, Tasmania, is late maturing and disease susceptible; in yield it compares favourably with Major, one of the chief wheats in Tasmania. Macquarie has been bred specifically as a biscuit wheat.

241. OLIVA, A.  
Vecchie e nuove razze granarie montane per la campagna 1951-52. (**Old and new varieties of wheat for the mountains for the 1951-52 season**).  
Humus, Milano 1951 : 7 : No. 8 : 7-10.

The old mountain wheats were very resistant to the rigours of the alpine and Apennine climate but low in yield. Attempts to replace them by wheats from northern climates, or even by the Russian perennial wheats, have invariably failed. A certain number of new varieties which are perfectly adapted to the conditions in question have however now been bred, namely Est and Mont Calme, closely followed by Rieti 11, 201, Catria and Niccoli. Some of the hybrids of Est with Mont Calme, Florence, Vilmorin and Poilu are promising in particular respects such as rust resistance, earliness or hardiness.

242. DIONIGI, A.  
*Triticum vulgare* batte *Triticum villosum*.  
Il frumento "Nazareno Strampelli 2".  
(***T. vulgare* beats *T. villosum*. The wheat "Nazareno Strampelli 2"**).  
G. Agric. Domen. 1951 : 61 : p. 123.

A new spring wheat hybrid from the cross Mentana x M33A is described. It ripens 14 days earlier than Mentana, and is extremely resistant to rust and spring frosts.

243. ÅKERMAN, Å.  
Vårveteodling och vårvetesorter.  
(**Spring wheat cultivation and spring wheat varieties**).  
Allmänna Svenska Utsädesaktiebolaget  
(General Swedish Seed Co.) Svalöf 1951 : 31-34.

Rival (01029) is a sister variety of Diamant II [Diamond II], which it surpasses in yield of grain and in strength of straw, while equalling it in quality. It also differs little in yield from Brons [Bronze] and Kärn II [Kernel II]. It can be recommended primarily as a competitor for Diamant II, Brons and Kärn II in the northern or higher-lying parts of the spring wheat area of Sweden.



244. TORPE, N. V.  
Resultat från försöken med vårvete vid Sveriges Utsädesförenings Värmlands-filial 1925-1950. (**The results of experiments with spring wheat at the Värmland Branch Station of the Swedish Seed Association 1925-50**). Sverig. Utsädesfören. Tidskr. 1951 : 61 : 95-99.

The failures and successes that have been encountered from time to time in attempts to provide suitable spring wheat for the Värmland region of Sweden are shortly described with tables showing the performance of varieties such as Diamant I [Diamond I], Diamant II, Dala, Rival, Ög 01140, Tammi, Kärn II [Kernel II] and Fylgia. Rival, Ög 01140 and Sv 46/550 are noted as promising in view of their yields in certain parts of Värmland. Rival and Ög 01140 are also approximately as early as Diamant II and have stronger straw.

245. PAL, B. P.,  
MURTY, G. S. and  
KHAN, H. R.  
**Registration of improved wheat varieties in India. 1. The New Pusa wheats.**

Indian J. Agric. Sci. 1950 : 22 : 165-72.  
In accordance with the proposal of the Indian Council of Agricultural Research to encourage registration of crop varieties developed in India, botanical descriptions are given of 24 New Pusa wheats recently developed at the Indian Agricultural Research Institute. These include eight varieties already released, namely, NP 4 and 12, selected from indigenous strains, NP 52 (Punjab 9 x NP 6), NP 80-5 (NP 4 x NP 6), NP 101 (Muzaffarnagar x Pusa 22), NP 111 which arose from NP 4 by mutation, NP 125 (NP 52 x Federation) and NP 165 (NP 4 x Federation). All eight wheats are adapted to particular localities where they give high yields.

246. **New fall wheat variety, Dawbul shows promise in recent tests.**

Canad. Grain J. 1951 : 7 : No. 1 : p. 23.  
Dawbul, recently developed at the Ontario Agricultural College, has outyielded numerous varieties, including Cornell 595.

247. JENSEN, N. F.  
**Cornell develops new wheat variety.**  
Fm Res. 1951 : 17 : No. 3 : p. 14.

Further reference to the release of Genessee winter wheat (cf. Abst. 289) gives details of the crosses from which the new variety was derived,

namely [(Honour x Forward) x Honour] x Yorkwin.

248. PUGSLEY, A. T.  
**Fifty years of wheat improvement in South Australia.**

J. Dep. Agric. S. Aust. 1951 : 54 : 435-40.  
Since the last century, four successive phases can be traced in the development of wheat varieties for South Australia. The first and second phases concerned the introduction of a wide range of material from which drought resistant, early maturing varieties were selected for adaptation to environmental conditions. Adoption of hybridization methods led to the development of smut and rust resistant wheats with improved yields, agronomic characters and milling and baking qualities. The fourth phase has involved the back-crossing technique, by which single characters have been improved in otherwise satisfactory varieties.

The outstanding contributions made by private breeders, Roseworthy College, the Department of Agriculture and the Waite Agricultural Research Institute are summarized.

249. WUNDERLICH, G.  
Kreuzungsversuche bei Weizen mit Hilfe der freien natürlichen Bestäubung. (**Crossing experiments with wheat by means of free natural pollination**). Bodenkultur, Wien 1951 : 5 : 174-76.

In the centre of a 10 x 6 m. plot of Tschermak's Marchfelder winter wheat, four 2 m. rows of Austro-Bankut wheat were sown and later emasculated. The ears of the Marchfelder plants were shaken vigorously at the time of pollen shedding. A similar experiment was made with Tassilo wheat planted in a plot of Ritzlhofer 2 winter wheat. A seed set of 60.1% was obtained in the first and 69.6% in the second experiment. Artificial pollinations gave seed sets varying between 10.5 and 47%, which illustrates the advantages of free natural pollination for crossing purposes.

250. CHIN, K. C.  
Sur les résultats de l'étude génétique de l'hybride *Triticum monococcum* var. *vulgare* et *T. vulgare* var. Hybride de la Paix. (**On the results of the genetic study of the hybrid *T. monococcum* var. *vulgare* and *T. vulgare* var. Hybride de la Paix**). Ann. Sci. Nat. (11e Sér. Bot.) 1950 : 11 : 185-96.

A discussion is presented of possible reasons for the vigour and fertility observed by the author

in progeny reared by him from the above cross (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 2482).

251. CHIN, K. C.  
Phénomène de dominance alternante à la quinzième génération d'un hybride: *Triticum monococcum* x *T. vulgare*. (**The phenomenon of alternating dominance in the fifteenth generation of a *T. monococcum* x *T. vulgare* hybrid**).  
C. R. Acad. Agric. Fr. 1951 : 37 : 349-50.

In continuation of his study of the above hybrid (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 2482), the writer records the occurrence in some plants of temporary dominance of the *T. monococcum* habit, followed by a return later to the *T. vulgare* type with the erect habit.

252. MATHON, C.-C.  
A propos d'une curieuse Triticinée; sur les organismes de nature hybride. (**On a curious specimen of the Triticinae; on organisms of hybrid nature**).  
Bull. Soc. Bot. Fr. 1951 : 98 : 130-33.

The author discusses a supposed hybrid plant which he discovered in France, and which he believes may be either a cross between *Aegilops* and wheat or a wheat in which hereditary changes may have been induced by the environment.

253. KIHARA, H. *ET AL.*  
(**The morphology and fertility of five newly synthesized kinds of hexaploid wheat**).  
Seiken Jiho (Biological Report) 1950 : No. 4 : 127-40. [Japanese].

Hexaploid wheats with 21 bivalents at meiosis have arisen in the  $F_2$  of crosses between *Triticum dicoccoides*, *T. durum*, *T. turgidum* and *T. persicum* on the one hand, and *Ae. squarrosa* on the other, presumably through the union of unreduced gametes. Though the amphidiploids fall into no existing specific categories, those from the first three combinations resemble *T. Spelta* in several respects, while that from the last combination resembles *T. vulgare*.

254. v. D. VAART, F. M.  
Genetische relatie van enkele tarwerassen. (**The genetical relationship of some varieties of wheat**).  
Eerste Jaarb. Stichting Coörd. Cult. Onderz. Broodgraan 1951 : 104-05.

All the winter and spring wheats included in the Dutch Variety List for 1951 (cf. p. 169) are shown in two separate pedigree charts for

which the present paper provides explanatory notes.

255. UCHIKAWA, I.  
(**The chromosome constitution of A type speltoid wheat**).  
Jap. J. Genet. 1946 : 21 : 107-08. [Japanese].

A type I dwarf homozygous compactoid wheat (ACC/ACC) was crossed with an A type homozygous speltoid. The  $F_1$  plants were semicompactoids, showing metaphase configurations of  $21_{II}$  or  $19_{II} + 1_{III} + 1_I$ . On selfing the  $F_1$ , the following types appeared: type I dwarf compactoids, with metaphase configurations  $21_{II}$  or  $19_{II} + 1_{III}$ ; semicompactoids,  $21_{II}$  or  $19_{II} + 1_{II} + 1_I$ ; A type homozygous and heterozygous speltoids,  $21_{II}$ ; normal wheats,  $21_{II}$ ; and type II dwarf compactoids,  $20_{II} + 1_I$ . The relative frequencies of these types were 1 : 2 : 0.9 : 0.2 : 0.06 respectively.

From these results, the author infers that A type homozygous speltoids cannot be of the chromosome constitution ABB/ABB, but must be  $ABC^m/ABC^m$ . The  $F_1$  would then be  $ACC/ABC^m$ ; the  $F_2$  type I dwarf compactoids,  $ACC/ACC$ ,  $ACC/ACC^m$  and  $ACC^m/ACC^m$ ; the semicompactoids,  $ACC^m/ABC$ ,  $ACC/ABC^m$  and  $ACC/ABC$ ; the A type homozygous speltoids,  $ABC^m/ABC^m$ ; the A type heterozygous speltoids,  $ABC^m/ABC$ ; and the normal wheats,  $ABC/ABC$  and  $ACC^m/ABC^m$ .

256. UCHIKAWA, I.  
**Genetic and cytological studies of speltoid wheat. IV. Origin of dwarf-compactoid wheat.**  
Mem. Coll. Agric., Kyoto 1943 : No. 55 : 1-38.

Further investigations of compactoid wheats (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2532) are concerned with dwarf compactoids, comprising the genotypes I and II, and their homozygous and heterozygous forms. Results of analyses of comparative fertility, germinating capacity and segregation ratios from numerous crosses are given. It seems probable that the type I heterozygous dwarf compactoid ( $2n = 42$ ) originated from a type I heterozygous compactoid which lost one B chromosome during an irregular meiosis and gained a duplicate C chromosome in its place. In the chromosomal configuration frequently observed,  $20_{II} + 2_I$ , one univalent resembles the C chromosome of compactoid wheat and the other, which is smaller, is assumed to be the remaining B chromosome bearing the speltoid gene complex. Type I homozygous dwarf compactoids



( $2n = 42$ ) have lost both B chromosomes and have, instead, a pair of duplicated C chromosomes. These homozygotes appeared among the segregating progeny of type I heterozygotes. Heterozygous type II dwarf compactoids ( $2n = 41$ ) generally have 20 bivalents and one univalent; the latter differs in size and form from the univalent observed in the heterozygous speltoid wheats with 41 chromosomes (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 222), but resembles the B chromosome of a type I heterozygous dwarf compactoid. Type II heterozygous dwarf compactoids may have developed by elimination of a B chromosome during irregular meiosis in a type I dwarf compactoid heterozygote from which gametes with only 20 chromosomes were produced. Among the progeny of the type II heterozygotes several homozygous forms were found possessing 20 bivalents only, having lost both B chromosomes.

These observations provide further evidence of the balance between a speltoid gene complex on the B chromosomes and a compactoid gene complex on the C chromosomes.

257. UCHIKAWA, I.

**Genetic and cytological studies of speltoid wheat. V. Origin of short-normal wheat.**

Mem. Coll. Agric., Kyoto 1943 : No. 55 : 39-79.

Detailed morphological and cytological descriptions are given of wheats with normal spikes but short culms. Plants with very short weak culms appearing in the progenies of type I heterozygous compactoids (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2532) are known as short normals. Both heterozygous and homozygous forms are distinguished, having the respective chromosomal configurations  $20_{II} + 1_I$  and  $20_{II}$ . Heterozygous short normals lack one chromosome. Since wheats deficient in a B chromosome are compactoids (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2532) and those lacking a C chromosome are speltoids (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 222), the deficient chromosome was assumed to be an A chromosome, semihomologous with B and C; the A chromosome was presumably eliminated during irregular meiosis. Heterozygous short normals have only one A chromosome, bearing either a culm-elongating gene or an inhibitor of the culm-shortening gene, while homozygous short normals appearing in the progeny of heterozygous types have no A chromosomes. Occasionally, type II heterozygous compactoids

give rise to plants with a slightly shorter culm than normal. These heterozygous mutants have a chromosome configuration of  $20_{II} + 1_I$ . The univalent resembles the C chromosome of a type II heterozygous compactoid, which is composed of a whole C' chromosome plus another  $S_2$  fragment (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2532). Consequently these mutants have been named C' normals.

Individuals phenotypically similar to C' normals have also appeared in the offspring of B series heterozygous speltoids (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 222), but these are cytologically distinct, having two univalents of unequal size ( $2n = 42$ ). One univalent resembles the C chromosome of speltoid wheat and the smaller element appears to be an  $S_2^2$  fragment from a C chromosome. The mutants are therefore known as  $CS_2$  normals. It is assumed that the univalent C chromosome of the speltoid B series split transversely into  $S_1$  and  $S_2$  fragments at second telophase, producing gametes with  $ABS_2$  and  $ABS_1$  instead of ABC.

In all three mutant forms the normal character of the spike is retained, thus giving further evidence of the balance between the speltoid gene complex on the B chromosome and the compactoid gene complex on the  $S_2$  fragment of the C chromosome.

258. ŠULYNDIN, A. F.

**(Changing the inheritance of plants by directed training).**

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 12 : 5-15. [Russian].

Mičurinite experiments with wheats and soya bean at the Stavropolj Agricultural Institute and at the Institute of Genetics and Breeding of the Ukrainian Academy of Sciences are described.

**Wheat**

As a result of training for spring habit the winter wheats *Lutescens* 329 and Hybrid 491 have been changed into spring varieties which reached maturity at the same time as Pioneerka [Pioneer] and *Melanopus* 69. The new spring wheats were less hardy than the initial varieties. Another variety, S-89, which is a hard spring wheat, changed into *Triticum vulgare* vars. *lutescens*, *erythrospermum*, *turcicum* and *millurum* when planted for several years as a winter wheat. These new winter wheats were harder than several spring wheats and hard winter and semiwinter wheats, but they were not as hardy as the soft winter wheats. The *turcicum* forms showed the highest degree of hardness.

## Soya bean

Varietal differences in response to artificial infection with nitrogen fixing bacteria are reported. No variety developed tubercles as a result of infection in the previous year, but the once infected plants of VNIIMK 52, 4958, Kubanskaja 276 [Kubanj 276], Kormovaja [Fodder] and Polukuljturnaja [Semicultivated] produced more tubercles when infected for a second time. Selection of varieties for their capacity to develop nitrogen fixing bacteria is advocated.

### 259. SCHIEMANN, E.

Emmer in Troja. Neubestimmungen aus den trojanischen Körnerfunden. (Emmer at Troy. Fresh determinations of the Trojan cereal discoveries).

Ber. dtsh. bot. Ges. 1951 : 64 : 155-70.

The cereal identified by earlier writers on the plant remains at Troy as *Triticum monococcum* has now been identified as a form of *T. dicoccum*. A barley related to *Hordeum maritimum* has also been identified. Other crop plants in the Trojan material include *Vitis vinifera*, *Vicia Ervilia*, *V. Faba*, another small species of *Vicia*, and *Pisum sativum*.

### 260. WADA, B.

(Observations on somatic cell division in living material of polyploid wheats).

Jap. J. Genet. 1946 : 21 : p. 61. [Japanese].

A comparative account is given of the course of mitosis in the stigmatic branches of *Triticum monococcum*, *T. aegilopoides*, *T. durum* and *T. Spelta*.

### 261. MATSUMURA, S.

(Chromosome conjugation and fertility in triploid wheat hybrids and their offspring).

Seiken Jiho (Biological Report) 1950 : No. 4 : 31-42. [Japanese].

Crosses were made in all combinations between the tetraploid species *Triticum dicoccoides*, *T. orientale*, *T. dicoccum*, *T. durum*, *T. turgidum*, *T. pyramidale*, *T. polonicum*, *T. persicum* and *T. Timopheevi* on the one hand, and *T. aegilopoides* and *T. monococcum* on the other. Vigorous though highly sterile hybrids were obtained in most cases, except in combinations involving *T. dicoccoides* and *T. dicoccum*.

From a study of chromosome association in the hybrids it is inferred that the A genome of *T. Timopheevi* has more affinity with Einkorn A

than has Emmer A. The G genome of *T. Timopheevi* appears to be semihomologous with Emmer B and may be as closely related to Einkorn A.

A few  $F_2$  hybrids were obtained by open pollination, mostly with  $2n = ca. 28$  chromosomes.

### 262. MATSUMURA, S.

(X-ray-induced chromosome aberrations in Einkorn).

Jap. J. Genet. 1946 : 21 : 91-92. [Japanese].

Aberration frequencies observed at the following metaphase were analysed in *Triticum monococcum* var. *vulgare* subjected to a graduated series of X ray doses. The relation between dose and aberration frequency approximated to the form  $y = ax^b$ , where  $y$  represents aberration frequency and  $x$  the voltage.

### 263. NAKAMURA, Y.

(The elimination of univalent chromosomes in pentaploid wheat hybrids).

Seiken Jiho (Biological Report) 1950 : No. 4 : 147-49. [Japanese].

In continuation of the earlier researches of Kihara and Matsumura (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 147), figures are given for the frequency of univalent elimination during pollen meiosis in *Triticum Spelta* x *T. durum*, *T. Spelta* x *T. persicum* and *T. Spelta* x *T. dicoccum*.

### 264. YAMASHITA, K.

(Studies on reciprocal translocations in Einkorn wheat. I. Analysis of new RT types).

Seiken Jiho (Biological Report) 1950 : No. 4 : 102-10. [Japanese].

By X irradiation of *T. aegilopoides* and *T. monococcum*, reciprocal translocations were obtained involving each of the seven chromosome pairs. The lines carrying the various reciprocal translocations were then intercrossed, and meiosis examined in the hybrids. In these, the homozygous interchanges exhibited seven bivalents; hybrids in which the interchanges were between the same chromosomes but involving different arms formed 4-membered rings; hybrids in which the two interchanges had only one chromosome in common formed 6-membered rings; while hybrids carrying interchanges with no common chromosome produced two 4-membered rings. By further crossing between lines carrying interchanges affecting each of the chromosomes, hybrids were obtained with 10-membered and 14-membered rings.



265. LARSON, R. I.  
**Aneuploids in genetics and breeding of wheat. 80th Annual Report of the Entomological Society of Ontario, 1949: 1-3.**

Methods by which different types of aneuploids are used in genetical analyses of polyploids, whose complexity confuses the results of more orthodox analytical techniques, are discussed with particular reference to the hexaploid bread wheats.

After completion of analyses it is hoped that aneuploids will be used to incorporate desired characters into a variety.

266. KONDO, N.  
**(Partial homology between the C<sup>u</sup> and E genomes of *Aegilops ovata*).**  
 Jap. J. Genet. 1946: 21: 59-60. [Japanese].

The meiotic configurations of crosses between *Ae. ovata* (C<sup>u</sup>C<sup>u</sup>EE) on the one hand and tetraploid *Ae. bicornis* (S<sup>b</sup>S<sup>b</sup>S<sup>b</sup>S<sup>b</sup>) and tetraploid *Ae. squarrosa* (FFFF) on the other suggest that the genomes C<sup>u</sup> and E are partially homologous.

267. MOTIZUKI [MOCHIZUKI], A.  
**(Fresh examples of haploid individuals in Einkorn).**  
 Jap. J. Genet. 1946: 21: 38-40. [Japanese].

Haploids have been obtained from *Triticum monococcum* var. *flavescens* x *T. aegilopoides* var. *Larionovi*, both when the latter parent was used in its normal form and after X irradiation. Data are provided on vegetative and floral characters of the haploids and on stomatal dimensions. In general, the haploids were smaller in all respects than the diploids.

268. LEE, J. W. and UNDERWOOD, E. J.  
**The influence of variety on the thiamin and nitrogen contents of wheat.**  
 Aust. J. Exp. Biol. Med. Sci. 1950: 28: 543-48.

Analysis of samples from variety trials in Western Australia has shown that variety has a significant effect upon thiamin and nitrogen contents. An almost equally high positive correlation between thiamin and nitrogen was found in Bungulla and Charter, with soft starchy and hard flinty grains, respectively. Differences in thiamin content between these two wheats could be largely accounted for by differences in nitrogen content. In the case of nine varieties from another set of trials, significant varietal

differences in thiamin content were obtained, even after adjustment for nitrogen content. Influence of environment upon thiamin and nitrogen contents equalled that of variety.

269. FUKASAWA, H.  
**(Studies on nuclear substitution in the amphidiploid *Aegilops bicornis* + *Ae. squarrosa* by successive back-crossing).**  
 Seiken Jiho (Biological Report) 1950: No. 4: 114-26. [Japanese].

The colchicine-induced amphidiploid of *Ae. bicornis* x *Ae. squarrosa* was successfully back-crossed with *Ae. bicornis* but not with *Ae. squarrosa*. The back cross hybrids with *Ae. bicornis* were back-crossed again to *Ae. bicornis*, giving hybrids with 14, 15 and 16 chromosomes. Among the 14-chromosome hybrids, some showed seven bivalents at meiosis and are presumed to be of the same genetic constitution as *Ae. bicornis*; some of these plants were more vigorous than the original *Ae. bicornis*. The 15 and 16 chromosome hybrids were less fertile and less vigorous than the 14-chromosome types.

270. GHISLENI, L.  
 Ultrasuoni e germinabilità. **(Supersonic waves and germinability).**  
 Nuovo G. Bot. Ital. 1948: 55: 567-69.

Supersonic waves depressed the germination capacity of wheat grains.

271. GHISLENI, L.  
 L'azione dei raggi U.V. sul grano. I: L'azione sulla germinabilità di cariossidi nate da piante trattate con raggi U.V. **(The action of ultraviolet rays on wheat. I. The action on the germinability of the grains derived from plants treated with ultraviolet rays).**  
 Nuovo G. Bot. Ital. 1948: 55: 358-74.

Moderate dosages of ultraviolet stimulated germination of wheat and increased the germination percentage. Heavier dosages depressed both the rate and percentage of germination.

272. NAGAMATU [NAGAMATSU], T.  
**(Ecological studies on the differentiation of the varieties of cultivated plants. II. The earing date of varieties of wheat collected from various localities).**  
 Jap. J. Genet. 1946: 21: 108-10. [Japanese].

A series of Japanese wheat varieties are differentiated by earing date, taking into account fluctuation due to locality and season.

273. CHINOY, J. J. and NANDA, K. K.  
**Effect of vernalization and photo-periodic treatments on growth and development of crop plants. II. Varietal differences in stem elongation and tillering of wheat and their correlation with flowering under varying photoinductive and post-photoinductive treatments.**  
 Physiol. Plantarum, Copenhagen 1951 : 4 : 427-36.

Further observations are reported (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2539) on the differential response of three wheat varieties to photoinductive and postphotoinductive treatments, with particular reference to stem elongation and tillering.

274. ADAM, D. B.  
**Cereals and grasses. Discoloured heads and other melanistic disturbances in wheat.**  
 Aust. Plant Dis. Recorder 1949 : 1 : p. 16. (Mimeographed).

Melanistic disorders in wheat were more evident than usual in South Australia during 1948. In a number of cases the discoloured heads did not appear to be associated with the occurrence of pathogenic organisms. Rust resistant varieties developed in South Australia, with Hope in their ancestry, are the most subject to melanistic disturbances. It is suggested that the problem should not be neglected by breeders.

275. RYŽEĬ, I. P.  
**(Development of soft winter wheats with ears producing many grains).**  
 Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 12 : 22-27. [Russian].

Mičurinite methods in breeding wheats for productive ears in Kirgizia are described. The aim is to obtain winter wheats with improved yielding capacity. Several promising wheats, including the following, were obtained by multiple hybridization and selection for ear characters.

Erythrosperrum P-5 was bred from the F<sub>1</sub> (Erythrosperrum 3 x Erythrosperrum 11) x Ferrugineum 48. It has ears with 22 to 30 spikelets, each spikelet producing four to six grains. The whole ear develops 60 to 130 grains and weighs 3 to 5 gm. The variety shows resistance to rust and lodging. It is being multiplied. P-25 was derived from a cross between an unspecified Indian variety and Erythrosperrum 15. The most promising

hybrids were then crossed with Graecum 182 and the selected families again crossed with Erythrosperrum L-1. Graecum 182 originated from Pseudo-Meridionale 122a x Ukrainka 246 and Erythrosperrum L-1 from Kanred-Fulcaster 266287 x Klein 33. P-25 has ears with 24 to 26 spikelets, some of them growing in pairs. The whole ear produces 100 to 162 grains and weighs 4 to 7 gm. The variety has strong straw and grain resistant to shattering. Several forms of wheat with branching ears were developed from Caesium 52 x Pseudo-Meridionale 122a, with a subsequent cross of the hybrid with Kooperatorka [Cooperator] and then with Erythrosperrum 72. Some forms produced rachillae 2.5 cm. long, upon each of which 6 to 8 grains were borne. In other forms the rachillae changed into separate rachides as in *Triticum turgidum* wheats. Other plants had branched rachillae producing three to seven productive spikelets. Lastly, some plants produced two to three productive spikelets at every node. At present, plants with branched rachillae producing 3 to 7 productive spikelets are the most promising, and a form, designated P-30, is being propagated in the hope that the desirable characters of the ear may become fixed. P-30 has an ear 13.7 cm. long with 18 to 26 spikelets. Of these spikelets, 9 to 12 are branched with 5 to 14 grains each. The whole ear bears 80 to 155 grains.

276. LARKIN, R. A.,  
 MACMASTERS, M. M.,  
 WOLF, M. J. and  
 RIST, C. E.  
**Studies on the relation of bran thickness to millability of some Pacific Northwest wheats.**  
 Cereal Chem. 1951 : 28 : 247-58.

Significant varietal differences in the thickness of the cross and tube cell layer, spermoderm, nucellar layer, and of the aleurone were recorded. Significant varietal differences in the thickness of the outer pericarp were not clearly shown. The thicknesses of the layers of the bran were not directly related to the general milling behaviour of the seven wheats studied.

277. BROEKHUIZEN, S.  
 De Technische Tarwe Commissie (1931-1941). [The Technical Commission on Wheat (1931-1941)].  
 Eerste Jaarb. Stichting Coörd. Cult. Onderz. Broodgraan 1951 : 29-42.

Details are given of the foundation, constitution, terms of reference and work of this Dutch Commission which is largely concerned with the



improvement of wheat quality in Holland. Relevant problems investigated have included research on the morphology of the wheat plant from the varietal aspect, on growth rhythm, on the tendency to sprouting in the ear, and on damage by heat and by gall midges in relation to quality (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 1216, 1227 and 1228).

278. FAJERSSON, F.  
Råproteinhalt och brödvolum. Några anmärkningsvärda resultat från kvalitetsundersökningar med vete. (**Crude protein content and bread volume. Some results worth noting from quality investigations with wheat.**)  
Agri Hortique Genetica, Landskrona 1951 : 9 : 1-9.

In this preliminary report, baking tests of five Swedish wheats are stated to have shown that high gluten quality can often compensate for rather low protein content. Experiments also showed that the marked increase in crude protein following lodging is not accompanied by a similar increase in gluten content.

279. **Physical, chemical, milling and baking data for Punjab wheats.**  
Pakistan J. Sci. 1949 : 1 : p. 110.

Data concerning the relative baking quality of four commonly grown varieties are listed; C 228 appears most desirable.

280. FAJERSSON, F.  
Kvalitetsundersökningar med Brons-vårvetet. (**Quality investigations with the spring wheat Brons.**)  
Agri Hortique Genetica, Landskrona 1951 : 9 : 10-17.

The loaf volume of the variety Brons [Bronze] (cf. *Plant Breeding Abstracts*, Vol. XV, Abst. 174) has proved lower than that of Kärn II [Kernel II], Atle, Progress and Diamant II [Diamond II], about the same as that of Pondus (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2523) and higher than that of Fylgia. In dough weight Brons at least equalled and in some cases surpassed these varieties, but in spite of its high crude protein content in relation to its yield, its gluten content is lower than might be expected. Gluten forming capacity seems to differ in varieties with the same crude protein content. High to average Pelshenke values apparently offer no basis for estimating the loaf volume of

varieties. Brons surpassed any of the comparable varieties studied in Pelshenke values.

281. SEEBORG, E. F.,  
SHOUP, N. H. and  
BARMORE, M. A.  
**Modification of the Buhler mill for micro milling.**

Cereal Chem. 1951 : 28 : 299-308.

A modification of the Buhler laboratory mill is described by means of which reliable data on milling quality from 100 gm. samples can be obtained. Preliminary results with five soft wheat varieties indicate that the method is useful for detecting poor milling quality earlier in breeding than was previously possible.

282. FAJERSSON, F.  
Bakningskraftiga vetesorter. Hur bör odlingen uppmuntras? (**Wheat varieties of high baking quality. How ought one to encourage their cultivation?**)  
Lantmannen 1951 : 35 : 501-02.

In this paper, read to the Swedish Section of the meeting of the Scandinavian Cereal Chemists at Stockholm, experiments on wheat quality were reported. The speaker stressed the importance of (1) promoting the growing in Sweden of wheats of high baking quality; (2) the varietal reaction to manuring, and also high gluten content as factors in determining quality; and (3) the question of regulating seed prices on a quality basis.

283. PARODI, L. R.  
La sinonimia de "*Triticum paradoxum*." (**The synonymy of *T. paradoxum*.**)  
Rev. Argent. Agron. 1951 : 18 : p. 112.

It is pointed out that the change in the name of *T. persicum* proposed by the author (cf. *Plant Breeding Abstracts*, Vol. X, Abst. 1014) had already been made by Nevski in 1934 and hence the authentic name of the species is *T. carthlicum*.

284. **World catalogue of genetic stocks. Wheat. Supplement No. 1.**  
FAO, Washington, DC 1951 : Pp. 34.

Since the first issue of this catalogue (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2248) was published, many more record forms have been received from numerous countries. The data concerning additional genetic stocks available as breeding material are presented in a manner similar to the original, in the form of a supplement.

285. MARINIČ, P.  
(The best varieties of winter wheat).  
Kolhoznoe Proizvodstvo (Collective Farming) 1951 : No. 7 : 25-27. [Russian].

Over 350 Soviet selected and local winter wheat varieties are still under trial. They include 140 new standards, the best of which are here described. Most of these standards have been already referred to in *Plant Breeding Abstracts*, although the previous records were less detailed in the case of some varieties than those contained in the present paper. The varieties described here in detail are Odesskaja 3 and 12 [Odessa 3 and 12], Lutescens 17, Erythrospermum 15, Lesostepka 75 [Woody Steppe 75], Novoukrainka 83 [New Ukrainian 83], Stepnaja 135 [Steppe 135], Uljanovka [Uljanov] and Alabasskaja.

286. ŠESTAKOV, V.  
(The winter wheat Penzenskaja Morozostoikaja).  
Kolhoznoe Proizvodstvo (Collective Farming) 1951 : No. 8 : p. 31. [Russian].

Selection at the Petrovskaja State Breeding Station, Penza province, of a local winter wheat, Šmitovka, has given Penzenskaja Morozostoikaja [Cold-resistant Penza], a new standard for the province. This new mid-season variety is productive and shows resistance to cold and drought. It has small semivitreous grain of good baking quality, and is more productive and hardier than the former standard, Rye-wheat Hybrid 46/131, and Lutescens 329 and Uljanovka [Uljanov].

287. DEMIDOV, S.  
(A review of the fulfilment of the fourth five year plan in agriculture).  
Socialističeskoe Sel'skoe Hozjaistvo (Socialistic Agriculture) 1951 : No. 5 : 3-17. [Russian].

Reference is made to new varieties of economic plants bred in the USSR. Several less recently developed cereals, including hard and soft spring wheats and some winter wheats and ryes, are listed.

288. TAPKE, V. F.  
Influence of preinoculation environment on the infection of barley and wheat by powdery mildew.

Phytopathology 1951 : 41 : 622-32.

Investigations carried out at Beltsville, Md., have revealed the influence of preinoculation conditions on the reaction of varieties of wheat and barley to *Erysiphe graminis* var. *Tritici*.

Susceptibility is increased by an environment promoting lush, tender growth, while resistance is greater when plants have been exposed to extreme "toughening" conditions. It is expected that awareness of pseudoresistance in genetically susceptible varieties will facilitate breeding for true resistance.

289.

**Two grain varieties released by New York are disease resistant.**

Crops and Soils 1951 : 3 : No. 8 : p. 30.

The characteristics of Genessee wheat and Erie barley (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2460), both released by Cornell University Agricultural Experiment Station in cooperation with the US Department of Agriculture, are reported. Genessee is a soft white winter variety with a high degree of resistance to loose smut (*Ustilago Tritici*) and moderately resistant to bunt (*Tilletia caries*); its resistance to lodging is similar to that of Cornell 595 but its resistance to shattering is higher. Genessee outyields Cornell 595 and Yorkwin by about 8% and produces high quality grain.

290. ABDUL HAFIZ.

**Physiologic specialization in *Urocystis tritici* Kœrn.**

Phytopathology 1951 : 41 : 809-12.

Eleven cultures of *U. Tritici* collected in six countries are grouped into four distinct pathological races according to the reactions of twelve wheat varieties originating from China, the USA and Pakistan.

291. BUTLER, F. C.

**Diseases of wheat in N.S.W.—1949/50.**

Aust. Plant Dis. Recorder 1950 : 2 : 1-2. (Mimeographed).

Strains of stem rust capable of attacking the hitherto resistant wheats Yalta, Kendee, Charter and Gabo occurred; Celebration and Warigo maintained their resistance. Hope hybrids in experimental plots at Tamworth showed false black chaff or melanism.

292. BOASSO, C. S. and

LEVINE, M. N.

**Leaf rust of wheat, *Puccinia rubigovera tritici*, in Uruguay.**

Phytopathology 1951 : 41 : 736-41.

In Uruguay at least 27 physiological races of leaf rust have been identified. Uruguayan and United States races with the same numerical designations often differ in pathogenic behaviour and thus in genetic constitution. Thew has



been found to be a particularly useful differential variety for Uruguayan races and biotypes. Gabo and Lee are effective for the identification of biotypes of races 11 and 15, and may prove useful as commercial or breeding material. Cappelli possesses a high degree of seedling resistance to all 29 races from the upper mid-west region of the USA with which it has so far been tested; this variety may also be useful in Uruguay.

293. WATSON, I. A. and  
BAKER, E. P.  
**Some notes on wheat rusts during 1950.**  
Aust. Plant Dis. Recorder 1951 : 3 : 21-22. (Mimeographed).

Four groups of stem rust, comprising biotypes of race 126, have been identified in New South Wales, using the differential varieties Yalta and Eureka. Four groups of leaf rust have also been recognized by means of Kenya 744 and Gabo; these groups are composed of biotypes of race 26 or 95.

294. LEVINE, M. N.,  
AUSEMUS, E. R. and  
STAKMAN, E. C.  
**Wheat leaf rust studies at Saint Paul, Minnesota.**  
Plant Dis. Reporter 1951 : Suppl. No. 199 : 3-17. (Mimeographed).

Three lines of investigation carried out at St. Paul, Minn., are summarized, namely: (1) the occurrence and distribution of physiological races isolated from wheat in the Upper Midwest during the period 1925 to 1949; (2) the seedling reaction of more than 100 varieties to different races of *Puccinia rubigo-vera* var. *Tritici* under greenhouse conditions; and (3) a comparison of the reactions of over 70 varieties grown in field plots during one or more of the ten years from 1938 to 1947, inclusive.

295. BAYLES, B. B. and  
RODENHISER, H. A.  
**New stem rust threatens wheat crop.**  
Crops and Soils 1951 : 3 : No. 8 : 25-26.

Mention is made of several selections, possessing some degree of resistance to race 15B of *Puccinia graminis*, which have been obtained from crosses between wheats from different parts of the world. These selections are undergoing further tests at the Minnesota Experiment Station and at Beltsville, Md. One new resistant variety, Kentana, bred by the Rockefeller Foundation in Mexico (cf. *Plant Breeding*

*Abstracts*, Vol. XXI, Abst. 1779), is being increased for release in northern Mexico and southern Texas.

296. WATERHOUSE, W. W.  
**New race of wheat stem rust in Australia.**  
Plant Dis. Reporter 1951 : 35 : p. 55.  
(Mimeographed).

A new race of *Puccinia graminis* var. *Tritici*, which first appeared in Queensland in 1948, has now spread throughout the south-eastern wheat growing region of Australia. Many formerly rust resistant varieties are susceptible to this race. By continued back-crossing, some resistant wheats are being produced to replace susceptible varieties.

297. WATSON, I. A. and  
BAKER, E. P.  
**Sources of resistance to cereal rusts.**  
Aust. Plant Dis. Recorder 1951 : 3 : p. 23. (Mimeographed).

The following are being found useful in breeding for stem rust resistance in New South Wales: Marquillo x Waratah x Ford Early Blackhull, Kenya 744, Kenya 117A, Hochzucht, Bokveld, Egypt NA 965, Hofed, Celebration, Rhodesian, *Triticum Timopheevi* derivatives, Khapli and *Agropyron*. It is hoped that varieties with combined resistance to crown rust races can be developed by suitable hybridization.

298. GARBOWSKI, L.  
Wrażliwość niektórych odmian pszenicy jarej na rdzę żdźbłową, *Puccinia graminis tritici* (Pers.) Er. et Henn. w stadium kłosa. [The susceptibility of some varieties of spring wheat in the spike stage to stem rust, *P. graminis Tritici* (Pers.) et Henn].  
Pam. Państw. Inst. Nauk. Gospod. Wiejskiego 1948 : 19 : Ser. D. : 301-20.

A study of the reaction of ten spring wheat varieties when exposed to mixed infection in the field by stem and leaf rust gave the following results:—

In the spike stage, the straw of the first group of wheats, Puławska Twarda [Hard Puławy], Suburczyńska Gółka, Janetzki, Heines Kolben and Kalinowiecka, was severely attacked by stem rust and in the first four varieties decreases of 24.5%, 10.2%, 13.2% and 9.3% respectively were observed in the 1000 grain weight. In the seedling stage, all five varieties were attacked by stem rust races 40 and 21. As regards *P. triticea*, the infection was weak in the first four

wheats in the spike stage, but Kalinowiecka, showed a moderate degree of infection.

In the spike stage, the second group of wheats, Ostka Chłopicka [Peasant's Bearded Wheat], Ostka Jara Puławska [Puławy Bearded Spring Wheat], Hildebranda and S 30 Hildebranda, exhibited weaker infection by stem rust than the wheats of group I and no decrease in the 1000 grain weight except Ostka Jara Puławska, which showed a decrease of 10.2%, probably owing to the very severe infection of this wheat by *P. triticina*, which attacked all the wheats of this group more severely than those of group I. In the seedling stage all the varieties were resistant to stem rust races 40 and 21, with the exception of S 30 Hildebranda, which was moderately resistant to race 21 but susceptible to race 40.

In the spike stage, the variety Ordynatka showed severe infection by stem rust without, however, any decrease in the 1000 grain weight. In the seedling stage, this wheat was resistant to stem rust races 40 and 21; *P. triticina* however, attacked it quite severely.

299. POPE, W. K.

**Wheat improvement adding smut, rust resistance.**

Idaho Agric. Sci. 1951 : 36 : No. 3 : p 6.

Breeding work carried out by the Idaho Agricultural Experiment Station aims to improve the disease resistance of popular wheats rather than develop basically new varieties. A high degree of rust resistance has been incorporated in Lemhi, a soft white spring wheat, by crossing with Kenya. After repeated back-crossing to Lemhi, careful tests are being made to ensure that the new rust resistant Lemhi resembles the susceptible form in other respects. An H-44 derivative and *Triticum Timopheevi* are also being used as sources of rust resistance for crosses with Lemhi and Idaed; at least six back crosses to the commercial varieties have been necessary to regain desirable agronomic characters. Brevor and Wasatch, two wheats with resistance to a large number of races of smut, have been crossed with a soft winter wheat, Golden, and a hard red winter wheat, Cheyenne, in an attempt to improve the smut resistance of both winter varieties.

300.

**Atlas "66" new wheat for Mississippi.**

Sth. Seedsman 1951 : 14 : No. 8 : p. 53.

Atlas 66 (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1771) has proved productive, disease resistant and winter hardy during tests at the Mississippi Experiment Station.

301. COOK, L. J. and  
HIGGS, E. D.

**Results of replicated trials with wheat varieties, 1948, 1949 and 1950.**  
J. Dep. Agric. S. Aust. 1951 : 54 : 541-47.

Data on the average yields per acre over the three year period at eight different localities show that Javelin 48 has consistently yielded well in all trials, outyielding other varieties at five centres. Bencubbin 48, Scimitar 48 and Insignia 49 have also given high yields in most areas.

302. THOMAS, I. and  
WATSON, E. R.

**Wheat variety trials on research stations—1950.**

J. Agric. W. Aust. 1951 : 28 : 39-48.

A brief historical survey of wheat breeding in Western Australia is given, with special reference to the technique of trials, resistance to flag smut and stem rust, and flour strength. The results of the 1950 trials in the different zones of the State are discussed and varietal recommendations are made.

303. BIAGINI, A.

**Sperimentazione granaria in provincia di Pisa. (Experiments on wheat in the province of Pisa).**

Agricoltura Tosc. 1951 : 6 : 307-15.

Details are given of trials of 20 varieties of wheat carried out in Pisa as a study of regional adaptation in that district for the benefit of Italian farmers.

## BUCKWHEAT

304. MEDVEDEV, P. F.

**(The use of phasic differences between the stem tissues in buckwheat breeding).**

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 11 : 29-32. [Russian].

A method of vegetative propagation of buckwheat has been developed at the Leningrad State Breeding Station. Cuttings taken from the apical portions of the plants had a better rooting capacity than cuttings taken from the basal portions, since the latter had phasically less mature tissues.

Plants reproduced from rooted cuttings of the apical stems were the earliest and plants from cuttings from the central stems were the most productive.



Hybrid seed has been obtained from free cross pollination of Harjkovskaja [Harjkov] x Althausen 11 and Burjat-Mongoljskaja [Burjat Mongolian] x Althausen 11. Both Harjkovskaja and Burjat-Mongoljskaja are tetraploids.

## OATS

305. ÅKERMAN, Å.  
Vilka äro de avkastningsrikaste havresorterna? (**Which are the highest yielding varieties of oats?**)  
Allmänna Svenska Utsädesaktiebolaget (General Swedish Seed Co.) Svalöf 1951: 23-24.

The types of white and black oats in cultivation in Sweden are described, and the productivity of some of the main varieties, e.g. Blenda, Rex, Örn [Eagle], Sisu, Bambu [Bamboo], Same and Orion, when grown on various soils, is briefly indicated.

306. COFFMAN, F. A.,  
STEVENS, H. and  
HOLTON, C. S.  
**Overland and Cody, two new short-strawed oats for the Northwest.**  
Agron. J. 1951 : 43 : 325-28.

The new oats Cody and Overland, developed from a cross between Bannock and a Victoria-Richland selection, are being increased and distributed. Both have short strong straw, and are highly resistant to smut and the common races of stem and crown rusts. They are however, susceptible to *Helminthosporium Victoriae*, and therefore unsuitable for the corn belt and eastern areas of oat production. In extensive tests, Cody has outyielded all other varieties under both irrigated and unirrigated conditions. It is a midseason oat, with outstandingly good test weight. Overland matures 4 or 5 days earlier than Cody, but still yields nearly as much as Victory and Colorado 37. As a companion crop for lucerne or clover Overland is superior to any other variety, on account of its earliness, short straw and resistance to lodging. It has lodged only about one-third as much as Victory, Bannock and Colorado 37.

307. BOHMONT, D. W.  
**Cody—a new oat for Wyoming.**  
Bull. Wyo. Agric. Exp. Sta. 1950 : No. 301 : Pp. 3.

Detailed information from the Wyoming Agricultural Experiment Station concerning Cody

(cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2591) includes yield data from both irrigated and dry areas where the new oat has consistently outyielded commercially grown varieties.

308.

### Branch oats adapted to northern Wisconsin.

Crops and Soils 1951 : 3 : No. 8 : p. 29.

A new variety of oats, named Branch, has been developed and released by the University of Wisconsin in conjunction with the US Department of Agriculture; it is recommended for the northern two-thirds of Wisconsin. The straw is tall but of only medium strength, so that lodging may occur on fertile soils. Branch matures at late mid-season and outyields most varieties grown in Wisconsin, except derivatives of Bond.

309. NICHOLSON, G.  
**Acacia—a new oat variety bred by Department of Agriculture.**  
Agric. Gaz. N.S.W. 1951 : 62 : p. 294.

Acacia, from a cross involving Victoria-Richland, Algerian and Fulghum, is late maturing, highly resistant to smut, moderately resistant to leaf rust but susceptible to race 8, and of good quality although a little short for milling. It is recommended for grain and grazing mainly in the northern and central tableland districts of New South Wales.

310. LESIK, F. L.  
**(The Mičurinite use of pollen mixtures in oat breeding).**  
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 12 : 35-37.  
[Russian].

Experiments in which fertile interspecific hybrids between *Avena sativa*, varieties Zolotoi Doždj [Golden Rain] and Pobeda [Victory], and *A. abyssinica* have been obtained are described. The florets of Zolotoi Doždj and Pobeda were emasculated two to three days before flowering and were then pollinated with a mixture of equal amounts of the pollen of *A. abyssinica* and of Zolotoi Doždj or Pobeda respectively. Another technique consisted of selfing Zolotoi Doždj and Pobeda during the day and cross-pollinating them with the pollen of *A. abyssinica* in the evening, or alternatively pollinating Zolotoi Doždj and Pobeda with *A. abyssinica* pollen in the evening and with self pollen on the following day.

Because of the different chromosome numbers of the two species the percentage of successful

crosses was low, and although 13,000 flowers were pollinated only 150 hybrid seeds were obtained. Despite their unhealthy appearance all these seeds gave normal fertile plants with a 50% or 75% seed set. Analyses of the  $F_2$  seed showed that all 150 plants were hybrids. The hybrids differed in respect of their chromosome numbers. All the fertile hybrids had  $2n \cong 42$  chromosomes.

The results are discussed in the light of Mičurinite theories on the role of the somatic and sex cells in fertilization.

311. HAMILTON, D. G.  
**Culm, crown and root development in oats as related to lodging.**  
 Sci. Agric. 1951 : 31 : 286-315.

Plant characters affecting resistance to lodging prior to maturity were studied in eight varieties grown in the field for three years at eight stations in Canada. Varieties possessing a high degree of lodging resistance had culms of greater diameter and also a larger, more rigid and more widely spreading development of coronal roots than susceptible varieties. Culm diameter, root type and plant height were found to be the main factors influencing resistance. Varietal differences in these characters were consistent in all tests although variations due to locality and year were considerable. Coronal root systems were classified according to a scale of 1 to 10, based upon differences in size and spread of roots and in the diameter of the basal internodes of the culms. The best stage for making varietal comparisons was after flowering and while the straw was still green. Correlation data revealed that varieties with the largest culms had the greatest number of coronal roots and strongest root types. No consistent relationship between tillering and degree of lodging resistance was detected. Erectness of leaf did not appear to be a reliable criterion for distinguishing types resistant to lodging. A lodging index for estimating varietal resistance, based upon the combined effect of basal culm diameter, root type and height, was devised. Histological examinations showed that culms of resistant varieties contained more vascular tissue and a larger area of thick-walled sclerenchyma than those of susceptible varieties. Resistant varieties did not necessarily have the greatest number of vascular bundles. In resistant varieties the vascular bundles and sclerenchyma were in close proximity. No features of the anatomy of the coronal roots were associated with lodging resistance.

In experiments on rate and depth of sowing, the stronger root types were produced with thinner sowing or shallow sowing. Differentiation of varieties for lodging resistance was much less satisfactory in greenhouse tests than in field experiments.

312. WELSH, J. N. and JOHNSON, T.  
**The source of resistance and the inheritance of reaction of 12 physiologic races of stem rust, *Puccinia graminis Avenae* (Erikss. and Henn.).**  
 Canad. J. Bot. 1951 : 29 : 189-205.

The progenies of crosses between 12 varieties of oats have been observed in respect of their reaction to 12 races of *P. graminis* var. *Avenae* common in Canada. Resistant lines were produced by the crosses Hajira x Jostrain, Hajira x Richland and Hajira x Banner. Three forms of resistance were discovered within the variety Hajira; only 10% of its progeny are resistant to all 12 races. It is supposed that natural crossing has occurred between Hajira selections with different reactions. Inheritance studies have shown that resistance to all races from most Hajira crosses is determined by a single dominant gene, but two genes govern resistance in the RL 1114.1 x 1681 and Canuck x Victory crosses. Data concerning seedling reaction show that the Hajira type of resistance to race 8 is indicative of resistance to all 12 races.

313.  
**Seedmen's corner.**  
 Canad. Grain J. 1951 : 7 : p. 23.

A new late maturing oat, named Craig, has been developed at the Cornell University Agricultural Experiment Station and is being multiplied for release. Craig has a high degree of rust resistance and outyields many commonly grown varieties.

314.  
**New oat variety released in Missouri.**  
 Crops and Soils 1951 : 3 : No. 8 : p. 29.

Mo. 0-205, resistant to *Helminthosporium Victoriae* and race 45 of *Puccinia coronata*, has been developed by the Missouri Agricultural Experiment Station from Columbia x (Victoria x Richland); it is well adapted to local conditions and heads about 3 days earlier than Clinton. The new variety has strong straw and a high yielding capacity.



315. CHAPMAN, W. H.  
**"Southland" invades gulf coast.**  
**Blight-fighting new oat boosts yields**  
**by 25%.**  
 Sth. Seedsman 1951 : 14 : No. 9 : 26, 30,  
 47.

Southland, developed from the cross (D 69 x Bond) x Fultex, has shown superiority for both grain and winter grazing on farms in the Gulf Coast area of Florida (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 263). It is resistant to Victoria blight and moderately resistant to crown rust, but susceptible to stem rust, *Helminthosporium* culm rot and winter injury. The variety has also been certified in other states.

316. ÅKERMAN, Å.  
 Några erfarenheter rörande angrepp av  
 fritflugelarver på havre. (Some find-  
 ings regarding frit fly larva attack  
 on oats).  
 Sverig. Utsädesfören. Tidskr. 1951 :  
 61 : 108-18.

*Oscinis frit* and other species produce three generations per year in Sweden, where breeding and selection for resistance have been in progress for some years. Tabulated results from the Svalöf Institute and the Ultuna and Kalmar branch stations show that the most resistant varieties of Swedish extraction are the central Swedish black oats Engelbrekt II and Stormogul II [Great Mogul II], while the resistant white oats include the following derivatives from Lochow's Gelbhafer [Yellow oat]: Örn [Eagle] Sol II [Sun II], Blenda, and lines 01632 and 01633, both from crosses of K 01450 x 01491.

317.  
**Oat variety trials 1949-1950.**  
 Mon. Rep. Minist. Agric. N. Ire. 1951 :  
 26 : 138-42.

Varieties recommended for soils of high fertility and poorer hill conditions in Northern Ireland are listed, based on the results of trials in the past year and average yield data over a number of years. On good soils, Glasnevin Triumph has combined high yields of straw with a grain yield significantly better than both the control variety (Stormont Arrow in most areas) and the general average of all varieties tested; observations indicate, however, that it lodges badly in heavy rain on highly fertile soils. Stormont Kern maintains its superior grain yield on poor soils and gives comparatively high yields of straw, but is outyielded in the latter respect by Tyrone Tawny.

Notes are included on the main characteristics of varieties under trial. It is emphasized that no oat as yet combines all the desirable agronomic characters.

318. MIDDLETON, G. K.,  
 HEBERT, T. T.,  
 COOKE, H. L. and  
 BYRD, W. P.  
**Arlington oats in North Carolina.**  
 Spec. Circ. N.C. Agric. Exp. Sta. 1951 :  
 No. 15 : Pp. 5.

A comparison of the grain and hay yield of oats commonly grown in North Carolina shows that, over four years, Arlington (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1582) has outyielded other varieties at seven trial centres. Arlington is also well adapted to North Carolina in respect of winter hardiness and mid-season maturity.

319. GARDNER, H. W. and  
 HUTCHINSON, J. B.  
**Variety and manurial trials with**  
**winter oats in Hertfordshire.**  
 J. Minist. Agric. 1951 : 58 : 208-16.

The results of 14 trials of S 147, Grey Winter and Picton for 4 seasons are reported. The data suggest that high protein content and high yield are not necessarily incompatible.

## RYE

320. MENGENSEN, F.  
 Die Wirkung der Inzucht auf verschiede-  
 ne Merkmale beim Roggen (*Secale*  
*cereale* L.). [The effect of inbreeding  
 on various characteristics in rye  
 (*S. cereale* L.)]  
 Z. Pflanzenz. 1951 : 30 : 218-49.

Selfed lines  $I_1$ — $I_3$  of rye and lines inbred up to a maximum of 20 generations were studied as regards the effect of inbreeding on fertility, length of ear and height of plant.

Despite the shortening of the ear and decrease in the number of flowers, due to degeneration, continued selection produced an increase in the number of grains per ear as the number of inbred generations rose. In the five year comparison of the lines the self fertility was found to depend markedly on environmental conditions. New improved lines obtained by crossing self fertile inbred lines to obtain double crosses showed in the subsequent  $I_1$ — $I_3$  a higher self fertility than the  $I_1$ — $I_3$  from Petkus rye.

In a three year comparison of lines, inbred for 15-20 years, length of the ear remained constant

except for a slight effect due to environmental conditions.

As the number of generations of inbreeding increased, the height of the plant decreased owing to degeneration till the inbreeding minimum was attained. A decrease was observed in the frequency of relatively vigorous lines exhibiting plant lengths less than 10% lower than those of the initial population.

After 15–20 years of inbreeding it was possible to isolate lines which, as regards self fertility, length of ear and height of plant, were either above, or below, the average for the 84 lines studied, and also some showing fairly marked degeneration in one of the three above mentioned characteristics.

321. WERNECK, H. L.

Ur- und frühgeschichtliche Roggenfunde in den Ostalpen und am Ostrande des Böhmerwaldes. (**Discoveries of rye in the eastern Austrian Alps and eastern border of the Bohemian Forest dating from prehistoric and early historical times**).

Züchter 1951 : 21 : 107–08.

The archeological discoveries of rye made from 1877 to 1946 at various places in Austria are concisely described. On the basis of these finds, the author puts forward new views on the origin and age of rye cultivation in the eastern Austrian Alps and the eastern border of the Bohemian Forest, and also in the western border of the Pannonian-Pontic vegetation region in Lower Austria and Styria.

322. GOUWS, J. B.

Die meiose van *Secale africanum* Stapf. (**Meiosis in *S. africanum* Stapf.**).

Natuurwet. Tijdschr. 1950 : 32 : 139–45.

Meiosis in *S. africanum* is regular, though bridges may be formed owing to delayed division of some bivalents. *S. africanum* can be crossed with *Triticum vulgare*.

323. KRESS.

Wie wirkt sich in ihrer ersten Nachkommenschaft ( $F_1$ ) die Bestäubung verschiedener Roggenarten untereinander leistungsmässig aus? (**How does inter-pollination of different varieties of rye affect the yield in the first generation ( $F_1$ )?**)

Z. Pflanzenz. 1951 : 38 : 143–47.

The varieties tested were Brand's Marien, Heines Hellkorn [Bright Corn], Petkus Short

Straw and Petkus Normal Straw, which was also used as the standard.

Petkus Short Straw rye was the only variety which, in each of the three years of testing, consistently showed an increase in the yield of grain; the yield of straw also increased, the straw being longer and approximating in length to that of Petkus Normal Straw rye.

The results in general show that rye varieties should not be exposed to pollination by each other.

324. KOZYRJ, A. T.

(**The economic and biological properties of the hybrids of rye**).

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 11 : 27–29. [Russian].

In experiments conducted in the Dnepropetrovsk province, Harjkovskaja 194 [Harjkov 194] and Taraščanskaja T-4 showed improvements in several economic and biological properties as a result of open pollination with V. Podoljanskaja [Veselyi Podol], Harjkovskaja 194, Taraščanskaja 2 and T-4, Voronežskaja SHI\* [Voronež SHI], Poleskaja [Polesje] and Novozybkovskaja M-4.

When open-pollinated, Harjkovskaja 194 and Taraščanskaja T-4 showed more vigorous and more uniform development than the pure varieties and higher resistance to drought and lodging. They were hardier, and had more tillers and more productive ears. The yield increases in Harjkovskaja 194 were between 1.1 c. to 2.0 c. per ha., and in Taraščanskaja T-4 0.7 to 3.8 c. per ha.

325.

**New Pierre rye proves winterhardy.**

Crops and Soils 1951 : 3 : No. 9 : p. 28.

Pierre, a new winter rye with outstanding winter hardiness, has been developed by the South Dakota Agricultural Experiment Station. Its average yield, test weight and percentage survival under severe winter conditions compare favourably with those of the locally grown varieties Emerald and Dakold.

326. GRAFIUS, J. E.

**Pierre rye.**

Bull. S. Dak. Agric. Exp. Sta. 1951 : No. 406 : Pp. 4.

Further information is given on winter hardy Pierre rye (cf. Abst. 325) developed by the South Dakota Agricultural Experiment Station

\* Seljsko-Hozjaistvennyj Institut [Agricultural Institute].



from 16 inbred lines of Dakold or Swedish parentage. The original hybrid vigour resulting from cross pollination has been lost; thus Pierre outyields other ryes only when winter killing is prevalent.

## MAIZE

327. ETTINGER, J. [Y.].

### (On the cultivation of maize).

Hassadeh 1951 : 31 : 425-27. [Hebrew].

The suitability of the Texan maize varieties Golden Dent and Surecropper for cultivation as irrigated crops in Israel is stressed again.

328. MURTHY, G. S.

### Hybrid maize.

Indian Fmg. 1951 : 1 : No. 5 : 20-22, 32.

A popular account of maize breeding compares the characteristics of inbreds and hybrids, with particular reference to hybrid vigour. The work of various research centres, where hybrid introductions are tested for adaptability to local conditions and new hybrids are being developed from Indian material, is briefly described.

329.

### New early hybrid corn resists leaf blights in Virginia trials.

Crops and Soils 1951 : 3 : No. 9 : p. 29.

The new short season maize hybrid Ohio C 54 is recommended as an early main crop variety for western Virginia. Its resistance to lodging is such that the planting rate can be increased by 200 to 400 more plants per acre than the widely grown US 13. Ohio C 54 produces high yields of good quality grain and is resistant to southern leaf blight (*Helminthosporium Maydis*), northern leaf blight (*H. turcicum*) and stalk rot (*Gibberella Zeae*).

330.

### Two corn hybrids released by Colorado for irrigated areas.

Crops and Soils 1951 : 3 : No. 9 : p. 28.

Colorado 120, a new early maturing maize hybrid, is well adapted to irrigated areas in northern Colorado. The other new hybrid, Colorado 330, has outyielded standard varieties on irrigated land in south-eastern parts of the state and has a high degree of smut resistance.

331. RHOADES, M. M.

### Duplicate genes in maize.

Amer. Nat. 1951 : 85 : 105-10.

Cases of duplicate factors reported in papers on maize genetics are discussed. Analyses of a

new set of duplicate genes,  $pg_{11}$  and  $pg_{12}$ , giving rise to a viable pale green phenotype, when both in the homozygous recessive condition, provide some support to the previous suggestion that the long arm of chromosome 9 contains redundant chromatin (cf. *Plant Breeding Abstracts*, Vol. VIII, Abst. 1535 and Vol. XV, Abst. 997). This analysis and the results of relevant work by other investigators indicate that the long arm of 9 has a duplicated segment including loci  $au_1$  and  $pg_{12}$ ; and that a duplication in the long arm of chromosome 6, between Y and  $Pl_1$  carries either  $w_5$  or  $w_6$  and  $pg_{11}$ . The long arm of 9 is not, however, entirely composed of redundant chromatin; spores deficient for segments of this arm abort. Whether or not duplicated regions are indicative of an ancient amphidiploid origin of maize or represent duplications occurring at a later stage cannot at present be decided.

332. SUTO, T.

### (On some new heritable characters in maize).

Jap. J. Genet. 1946 : 21 : 48-50. [Japanese].

A synopsis is provided of the mode of expression and dominance and linkage relations of the following newly discovered genes:  $ij^v$  and  $ij^x$ , for white and yellow striped leaves, respectively;  $j_1^v$  and  $j_1^x$ , also for white and yellow striped leaves, respectively;  $j_1^{\alpha}$ , a gene differing from  $j_1^v$  in that, under appropriate warm temperature, the striping disappears;  $v_{21}^{\alpha}$  and  $v_{21}^{\beta}$ , genes for yellow virescent seedlings, the former conditioning a deeper and more persistent yellow pigmentation than the latter;  $v_{22}^{\alpha}$  and  $v_{22}^{\beta}$ , also for yellow virescent seedlings, the former determining a deep yellow pigmentation persistent under high temperatures, the latter determining pale greenish yellow pigmentation, evanescent under high temperatures;  $ys_3$ , a gene whose phenotype resembles that of  $v$  at first, after which green pigmentation develops along the veins;  $gs_3$ , causing loss of green colour between the veins of leaves initially normal;  $li_2$ , for longitudinal spotting;  $ad_4$ , for inrolled leaf;  $ad_5^{\alpha}$  and  $ad_5^{\beta}$ , for adherent inrolled leaves, the degree of adhesion being greater in  $ad_5^{\beta}$ ;  $ma$ , for punctate leaf;  $dm_2$ , for marginal withering;  $an_3$ , for stunted leaf; and  $Hs_2$ , for the development of white hairs on the leaf sheath. The linkage groups determined for the various genes are as follows:  $ij^v$  and  $ij^x$ , VIII;  $j_1^v$ ,  $j_1^x$  and  $j_1^{\alpha}$ , VIII;  $v_{21}^{\alpha}$  and  $v_{21}^{\beta}$ , ?VIII;  $v_{22}^{\alpha}$  and  $v_{22}^{\beta}$ , II;  $ys_3$ , VII;  $gs_3$ , II;  $li_2$ , ?X;  $ad_4$ , II;  $ad_5^{\alpha}$  and  $ad_5^{\beta}$ , V;  $ma$ , VII;  $dm_2$ , V; and  $an_3$ , II.

333. ROSECKÝ, J.  
Využití sovětské agrobiologie v rostlinné výrobě na ČSSS. (**The application of Soviet agrobiolgy to plant production on Czechoslovakian state farms**).  
Věstn. Čsl. Akad. Zeměd. 1951 : 25 : 307-10.

Notes on the introduction of Mičurinite methods, including vernalization and supplementary fertilization of cereals and other plants, are given. Mention is made of heterotic seed of maize obtained in Czechoslovakia from Hodoninské Koňské Zubu [Hodoninské Dent] x Hodoninské Rané [Early Hodoninské], Zajičková Koňské Zubu [Zajiček Dent] x Florentinsky [Florentine] and Hodoninské Rané x Valtitské. The hybrids outyielded Hodoninské Koňské Zubu by 37.5%, 56% and 37% respectively.

334. CELIDONIO, C.  
I mais ibridi in Piemonte. (**Hybrid maizes in Piedmont**).  
G. Agric. Domen. 1951 : 61 : p. 158.

Yields of up to 99.5 quintals per ha. have been obtained from the hybrid Funk G 114, compared with 43 q. for the control, Nostrano dell'Isola. Other hybrids that have done well include U 41, Maygold 99 A and Insubria 1.

335. FENAROLI, L.  
Criteri di scelta del mais ibrido. (**Criteria for choosing hybrid maize**).  
G. Agric. Domen. 1951 : 61 : p. 91.

General explanations are given for Italian growers of hybrid maize, with indications of the best hybrids for various conditions. Hybrids produced in Italy have exceeded the yield of the control, Nostrano dell'Isola, by 39-49% over the last three years. A table is given of the hybrids available, showing their maturity times and the conditions for which each is suitable.

336. VERWAEST, J.  
La culture du maïs grain et du maïs fourrager. (**Maize cultivated for grain or as a green fodder**).  
Rev. Agric., Bruxelles 1951 : 4 : 1196-1202.

Reproduction in maize and the productivity of ordinary varieties as compared with maize hybrids are considered. Good yields are recorded from the Goudster hybrid bred in Holland. In general, however, it has been noted that hybrid maizes show higher yields as the place of cultivation becomes more southerly,

and in Holland yields were scarcely better than those from ordinary varieties.

337. BECKER, W. R.  
Maisrassen- en -standruimteonderzoek. (**Experiments on maize varieties and spacing**).  
Versl. Cent. Inst. Landbouwkundig Onderz. 's-Gravenhage 1950 : 94-98.

These experiments included a comparative trial of 27 varieties in which the variety Goudster, derived from a cross of the very early flint maize Baanbreker [Pioneer] with the early dent Noordlander, retained its superiority in yield and earliness. Other hybrids of considerable interest, CIV 1, 2, 3, 5, 6, 9 and 10, were obtained from crosses of the flint maize Baanbreker with American early, single hybrids. Similar to the CIV series was the cross (WD x W9) x Vroege gele ronde CB [Early Yellow Round CB] in which the female parent was an early American dent single cross and the pollen parent an early Dutch flint maize.

338. ETTINGER, J. [Y.].  
(**Summary of experiments in grain growing under irrigation**).  
Hassadeh 1951 : 31 : 211-13. [Hebrew].

The highest yields with American maize varieties grown for grain production in a number of irrigated plantations in Israel were obtained from hybrid Texas 7. Varieties Surecropper and Shen hassus [Dent] produced the largest and best quality ears.

339. LAUMONT, P.  
Observations sur le maïs hybride et l'intérêt de sa culture en Algérie. (**Observations on hybrid maize and the interest its cultivation has for Algeria**).  
Rev. Agric. Afr. N. 1951 : No. 1645 : Pp. 6.

This popular pamphlet defines hybrid maize and describes how it is produced, with notes on one season's trials of hybrid maize in Algeria and its possible use in agriculture.

340. RATTRAY, A. G. H.  
**Maize. Hints for the new farmer.**  
Rhod. Agric. J. 1951 : 48 : 123-34.

A brief account of the white dent hybrids available for commercial planting in Southern Rhodesia is included. They are all similar in type to the open-pollinated variety Salisbury White, give good results under drought



conditions, and mature 10 to 14 days earlier than Hickory King or Salisbury White.

341. MANGELSDORF, P. C.

**Hybrid corn.**

Sci. Amer. 1951 : 185 : No. 2 : 39-47.

An account is given of hybrid maize and its impact upon agriculture in the USA and other countries. Future developments are discussed. Experiments are now being carried out to study the possibilities of (1) producing homozygous lines by doubling the chromosome number of haploids as a result of colchicine treatment; (2) producing homozygous lines by X ray treatment of seeds to induce chromosome breakage, followed by hybridization with normal plants and self pollination of the hybrids; and (3) using cytoplasmic male sterility and genes for fertility for the production of pollen fertile double crosses without detasseling.

342. BAUMAN, L. F. *ET AL.*

**Experimental corn hybrids. 1950 tests.**

Bull. Ill. Agric. Exp. Sta. 1951 : No. 543 : 75-99.

Data are presented concerning the trials of over 400 newly developed maize hybrids in respect of their adaptability, yielding capacity, date of maturity, lodging resistance and other agronomic characters at six localities in Illinois.

343. NEAL, N. P.,

STROMMEN, A. M. and

APPLE, J. W.

**Wisconsin corn hybrids.**

Bull. Wis. Agric. Exp. Sta. 1951 : No. 476 : Pp. 35.

This revised edition gives more detailed information on the aims and methods of hybrid maize breeding at the Wisconsin Agricultural Experiment Station than the original bulletin and brings up to date the list of commercial hybrids. Hybrids released in 1950 or 1951 for seed production comprise W270, W341A, W464A, W416AA and W685 (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2287 and Vol. XXI, Abst. 1814).

- 344.

**New hybrid corns ready for state.**

Colo. A. and M. News 1951 : 6 : p. 4.

The new maize hybrids Colorado 120 and Colorado 330 are adapted to irrigated areas and show superiority in yield and other characters

over standard hybrids grown in north and south-east Colorado, respectively.

- 345.

**Midwest corn breeders adopt new system for naming corn hybrids.**

Crops and Soils 1951 : 3 : No. 8 : p. 30.

Maize breeders in 13 states of the USA have decided to adopt a uniform naming system for hybrids, replacing the name of each state with AES. Thus, three new hybrids, Iowa 4527, Neb. 893 and Neb. 1219, have become AES 801, AES 802 and AES 803, respectively.

346. LONNQUIST, J. H.

**Recurrent selection as a means of modifying combining ability in corn.**

Agron. J. 1951 : 43 : 311-15.

A method of recurrent selection for general combining ability in maize is described, by means of which the frequency of favourable genes for yield within a population prior to inbreeding can be increased. The method consists of repeated cycles of selfing and test crossing  $S_0$  plants in a heterozygous population. A composite of selfed seed of the  $S_0$  individuals with the highest yielding capacity, as indicated by their performance in crosses with the tester, is sown, and random intercrossing allowed for several generations before initiation of the next cycle.

- 347.

Årsberättelse för-1950 avgiven den 28 januari 1951. (**Annual report for 1950 issued on 28 January 1951**).

K. LantbrAkad. Tidskr. 1951 : 90 : 13-30.

Points of interest to the plant breeder in this report of the Royal Academy of Agriculture, Sweden, are: (1) the importance of green maize for silage and the promising results that Swedish breeders may attain by improving the hybrid maize material from the USA; and (2) the furtherance of research on sex in mosses, on breeding for resistance to nematodes, especially in red clover, and on proper methods of harvesting field peas.

348. CAPINPIN, J. M. and

CRUZ, R. F.

**Effects of inbreeding Lagkit corn.**

Philipp. Agric. 1950 : 34 : 10-15.

An inbreeding experiment with Lagkit maize at Los Baños, Laguna, has shown that more plants with chlorophyll deficiency, dwarf habit,

sterility and ear abnormalities develop among the progenies of  $F_1$  inbreds than from open-pollinated plants. It is hoped that abnormal characters will be eliminated by subsequent inbreeding to give pure lines with desirable qualities; these will be crossed to increase vigour.

349. ERWIN, A. T.

**Sweet corn—mutant or historic species?**

Econ. Bot. 1951 : 5 : 302-06.

Evidence is presented to substantiate the theory that sweet corn arose as a mutation in lines of dent maize. During the past 20 years four mutations from starchy to sugary kernels have been observed in hand-pollinated stocks of dent maize at Ames, Iowa. Others may have escaped observation in the large populations produced. Such mutations may have occurred at frequent intervals from the time maize was introduced to North America. In recent times it is supposed that the great majority of such mutations have been regarded as contaminations and consequently destroyed.

350. LINNERT, G.

Die Einwirkung von Chemikalien auf die Meiosis. (The action of chemicals on meiosis).

Z. indukt. Abstamm.- u. VererbLehre 1951 : 83 : 422-28.

When a mixture of ethylurethane and KCl was injected into young male inflorescences of *Zea Mays*, an effect was observed after 1 hour, in the form of meiotic irregularities. It was seen that even in chromosomes that had already divided into four chromatids, breaks affecting the whole chromosome occurred. These breaks were responsible for the chromosome mutations produced, and not nonhomologous pairing. The mutations clearly occurred at the pachytene stage and not in the resting nucleus.

351. ROMAN, H. and

ULLSTRUP, A. J.

**The use of A-B translocations to locate genes in maize.**

Agron. J. 1951 : 43 : 450-54.

Nondisjunction of the B type chromosome during the second mitotic division of microsporogenesis in homozygotes which have undergone translocation between A and B type chromosomes (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 912) results in the production of unequal gametes; one carries two  $B^A$  chromosomes while the other is deficient in this

chromosome. When a normal seed parent is pollinated by a plant homozygous for an A-B translocation, the phenotypic expression of the offspring resulting from fusion between a normal and a functional but deficient gamete is attributed to the absence of alleles located in the A type segment of the missing  $B^A$  chromosome. The alleles *Hm* and *hm*, determining the reaction of maize to *Helminthosporium carbonum* race 1, were chosen to demonstrate the method by which A-B translocations and unequal gametes can be used to locate genes on specific chromosomal segments. Analyses of progeny resulting from crosses between the susceptible hybrid K 61 x PR and plants homozygous for the translocation TB-1a, and between K 61 x PR and plants homozygous for the translocation TB-1b show that the *Hm* locus is in the distal 7/8 of the long arm of chromosome 1, approximately 22 recombination units from the centromere.

The 11 translocations which have so far been identified are listed and the position of each breakage point in relation to the centromere is indicated.

352. RICHEY, F. D. and

DAWSON, R. F.

**Experiments on the inheritance of niacin in corn (maize).**

Plant Physiol. 1951 : 26 : 475-93.

Further data are presented in support of the view that the inheritance of niacin content in the maize kernel depends upon a multiple factor system involving many genes of small individual effects and upon the interaction of the pleiotropic alleles *Susu* with this system (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 2222). The gene *su* behaves as a simple recessive for high niacin content to *Su*; the niacin concentration of sugary kernels was on the average approximately 60% higher than that of starchy kernels from the same progeny. The interaction of *Susu* with the multiple gene system was not strictly additive, since the concentration of the sweet kernels in sweet x starchy hybrids was larger, both absolutely and on a percentage basis, when the multiple factor background in the starchy inbred parent was for higher niacin content than when this background conditioned a lower content. The *su* genes from different inbreds varied in the degree to which they increased the niacin concentration above that associated with *Su*. Kernel size, environment, or physiological differences in the seed parents with the genotypes *Susu* and *susu* showed practically no influence on niacin concentration;



in starchy maize the seed parent exercised twice the genetic influence of the pollen parent upon niacin concentration. Selection for high niacin content in sweet corn is being carried out; in some cases encouraging results have been obtained; one selected ear from the 1949 crop had a concentration of 91.8 mgm. per grm. Progress has also been made in selecting for high and low concentrations in starchy maize; in one series of crosses between starchy lines with high contents, some evidence was obtained that the high concentration of niacin of the parents depended upon an accumulation of recessive genes. The possible mode of biochemical action of the genes controlling niacin formation is discussed.

353. HOROVITZ, S. and OBREGÓN, P.  
El carácter de "anthers indehiscentes" en maíz y su posible utilización en la producción de híbridos. (**The character "indehiscent anthers" in maize and its possible use in the production of hybrids**).  
Agron. Trop. Rev. Inst. Nac. Agric., Venezuela 1951 : 1 : 77-82.

Self pollination of a local Venezuelan maize variety Chuco amarillo [Yellow Chuco] produced progenies containing a certain number of plants with indehiscent anthers; the pollen contained in them proved to be viable and crosses with it showed the character to be a simple recessive, *id.* Since it can be maintained therefore in the homozygous state it is thought that this character will be more useful than male-sterile lines in obviating emasculation in the production of hybrids. When a yellow-grained line with indehiscent anthers was planted in proximity with a white-grained normal variety, Venezuela 3, only 212 out of 84,670 grains of this latter were yellow, showing the risk of pollination from the indehiscent line to have been only 0.2501%.

354. BULLER, R. E. and HUBER, L. L.  
**Hybrid seed corn production simple; isolation of fields prime necessity.**  
Science for the farmer. 63rd Annual Report of the Pennsylvania Agricultural Experiment Station 1951 : Bull. No. 529 : Suppl. No. 3 : 3-4.

A description is given of the methods by which the relative distribution of maize pollen is determined in Pennsylvania, with respect to

the isolation distances necessary to prevent outcrossing and maintain the purity requirements of the International Crop Improvement Association.

355. EVERETT, H. L.  
**A new twist to the double cross.**  
Gdn J., N.Y. 1951 : 1 : 114-16.

The use of cytoplasmic male sterility for the production of hybrid maize seed is discussed. The pollen fertility of the crop raised by the farmer can be restored by mixing seed of sterile and fertile hybrids or by incorporating genes for pollen fertility in the male parent.

356. JOSEPHSON, L. M.  
**Effect of maleic hydrazide in delaying flowering in corn.**  
Agron. J. 1951 : 43 : 404-05.

Concentrations of maleic hydrazide which are sufficient to delay flowering or induce pollen sterility in the maize inbred WF 9 and the hybrid WF 9 x 38-11 also cause considerable yield reductions. The use of this chemical for inducing male sterility and making hybridization possible between varieties which normally differ in time of flowering may not, therefore, be practical for seed production.

357. MILLER, P. A. and BRIMHALL, B.  
**Factors influencing the oil and protein content of corn grain.**  
Agron. J. 1951 : 43 : 305-11.

Increased oil content in the maize grain depends chiefly upon increased proportion of the germ and increased concentration of the germ oil. Whole grain analyses for oil content provide a satisfactory basis of selecting for increased percentage of germ oil. Variation in total oil percentage was not closely correlated with variation in total protein percentage. Total oil percentage was however positively correlated with percentage of germ protein and relative concentration of tryptophane in the kernel. Thus increased oil percentage may be associated with increased percentage of relatively high quality protein. The genotype of the female parent exerted a predominant influence on the oil percentage of the grain; pollen source showed a consistent but relatively small effect. Data were obtained suggesting that the oil content may be increased up to 3% without a corresponding loss in grain yield due to reduction in starch content.

358. SARKAR, B. C. R.,  
LUECKE, R. W.,  
HUFFMAN, C. F. and  
DUNCAN, C. W.

**The chemical composition and nutritive value of yellow dent corn grain: II. The thiamin, riboflavin, niacin and pantothenic acid content.**  
Quart. Bull. Mich. Agric. Exp. Sta. 1951 : 33 : 361-71.

In an analysis of 25 samples of yellow dent maize, grown in widely separated areas of the United States, a significant negative correlation was found between protein and niacin content but no correlation\* was detected between protein or ether extract and any of the B vitamins, or between any of the components of the vitamin B complex. A useful review of literature on the vitamin B composition of maize, including the influence of heredity, is provided.

359. SINGLETON, W. R.  
**Inheritance of corn grass: a macro-mutation in maize, and its possible significance as an ancestral type.**  
Amer. Nat. 1951 : 85 : 81-96.

A full account of investigations on corn grass is presented (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1829).

360. LENG, E. R.  
**Time-relationships in tassel development of inbred and hybrid corn.**  
Agron. J. 1951 : 43 : 445-49.

At the Illinois Agricultural Experiment Station, investigations concerning time-relationships in the ontogeny of male inflorescences have shown that three maize inbreds, WF 9, 38-11 and L 317, are characterized by the length of time between planting and initiation of the male inflorescence, and between initiation and anthesis. Although environment may modify the length of each phase, the characteristic pattern is retained and inherited. Variation in the absolute and relative lengths of the two phases indicates that they are controlled by different genetical factors. A comparison of inflorescence ontogeny in WF 9 x L 317, WF 9 x 38-11 and 38-11 x L 317 with respect to the parent inbreds shows an acceleration of both developmental phases in the hybrids. It is assumed that from advanced segregating progenies of WF 9 x L 317, early maturing lines may be selected combining the very short first phase of WF 9 with the short second phase

typical of L 317. Similarly, from other crosses it should be possible to obtain hybrids which mature later than either parent.

361. **Four plants from one seed now being studied in Illinois.**  
Crops and Soils 1951 : 3 : No. 9 : p. 31.

The unusual occurrence of polyembryony in maize, involving three extra seedlings, is being investigated at Illinois University.

362. SASS, J. E.  
**Comparative leaf number in the embryos of some types of maize.**  
Iowa St. Coll. J. Sci. 1951 : 25 : 509-12.

Inbred lines and geographical varieties differed in the number of embryonic leaves in the dormant kernel. No consistent relationship between embryonic leaf number and earliness of maturity or final size of plant was detected.

363. TEAS, H. J. and  
NEWTON, A. C.  
**Tryptophan, niacin, and indole-acetic acid in several endosperm mutants and standard lines of maize.**  
Plant Physiol. 1951 : 26 : 494-501.

The above constituents were estimated in mature endosperms of the following types: waxy (*wx*), sugary-1 (*su*<sub>1</sub>), shrunken-1 (*sh*<sub>1</sub>), shrunken-2 (*sh*<sub>2</sub>), brittle-1 (*bt*<sub>1</sub>), brittle-2 (*bt*<sub>2</sub>), miniature (*mn*) and normal kernels from the same ears. On the basis of amount per gram, brittle-2, shrunken-2 and miniature endosperm had tryptophane contents over twice the normal. Sugary, brittle-1, brittle-2, shrunken-1, shrunken-2 and miniature had 1.6 to 5.1 times the normal niacin content. Sugary, brittle-1, brittle-2, shrunken-1 and shrunken-2 had 1.6 to 2.6 times the total indoleacetic acid content of normal endosperm. Since the mutant types possess smaller seeds, comparisons on the basis of amount per kernel and on amount per gram did not show the same mutant/normal ratios. Data on weights per kernel indicated that waxy and shrunken-1 were similar in chemical composition to normal endosperm but that the other mutants differed significantly from the normal in the amount of at least one of the three constituents analysed. Problems of making assays of such mutants are discussed. Except in shrunken-1, the difference in assay values for mutant and normal types could not be explained in terms of arrested development.



364. DVONCH, W.,  
KRAMER, H. H. and  
WHISTLER, R. L.  
**Polysaccharides of high-amylose corn.**

Cereal Chem. 1951 : 28 : 270-80.

Maize lines breeding true for endosperm type and involving different combinations of four sets of alleles, *Su*, *su<sup>am</sup>* and *su*, *Su<sub>x</sub>su<sub>x</sub>*, *Dudu* and *Wxwx*, were analysed for water soluble polysaccharides, starch and amylose content of the starch. With the exception of genotypes homozygous for *wx*, amylose and starch contents were negatively correlated ( $r = -0.81$ ). The relationship between amylose content and water soluble polysaccharides was more clearly dependent upon specific genotypes. The effect of *su* was the most striking. Alone, or in combination with *wx*, *su<sub>x</sub>* or *du*, *su* increased the water soluble polysaccharides to more than 38% and reduced the starch content to less than 30%. With respect to amylose content, *su* was masked by *wx*. *Su* interacts strongly with *du* to increase amylose content, and appears to act independently of *su<sub>x</sub>* in affecting amylose content. Alone, *su* results in only a slight increase in amylose. Starch granules of the various genotypes differed in microscopic appearance from those of normal maize, and in some cases, in X ray diffraction patterns. Starches with high amylose content did not gelatinize in the usual fashion. The amylose and amylopectin components of the starches were similar to components of starch from normal maize, except that the amylopectins from lines homozygous for *su* and *du* or *su<sup>am</sup>*, *su<sub>x</sub>* and *du* had periodate end-group assays of 11 and 13 respectively, as compared to the assays of 20 to 30 for normal starch amylopectin; low values of intrinsic viscosities were also obtained in some cases. Variation in carbohydrate interrelationships occurred within genotypes, suggesting that modifiers and environmental factors are operative.

365. HUBER, L. L.,  
HARROD, J. E. and  
SCHAAF, H. M.  
**Pennsylvania corn performance studies. Double cross tests 1950.**  
Progr. Rep. Pa Agric. Exp. Sta. 1951 :  
No. 54 : Pp. 8.

Tabulated data are presented concerning the evaluation of 99 double cross maize hybrids grown in ten counties under the supervision of the Pennsylvania Agricultural Experiment Station during 1950. The characters considered

were yielding capacity, percentage of moisture at harvest, rate of development and reaction to *Helminthosporium* leaf blight, *Gibberella* stalk rot, smut and insects.

366. ZIMMERMAN-GRISS [TSIMMERMAN-GRISS], S.

**(How and when was the De Wolff maize introduced into Israel?)**

Hassadeh 1951 : 31 : 476-77. [Hebrew].

Seed of 18 varieties of maize, raised by Zapparoli in Italy, was brought to Palestine by the author in 1937. The following, listed in order of merit, were found particularly suited to local conditions: the early varieties, De Wolff, Nostrano dell'Isola normale, Nostrano dell'Isola basso and Celia; and late varieties, Rostrato, Scagliolo and Marano. The last-named variety withstands arid conditions and high temperatures.

367. CHAVAN, V. M.,  
KELKAR, S. G. and  
BIDARI, P. G.  
**Hybrid maize for the Gokak Canal Tract in Bombay State.**  
Indian Fmg 1950 : 11 : 453-55.

An account of maize breeding at Arbhavi since 1934 is presented in greater detail than that already summarized in *Plant Breeding Abstracts*, Vol. XX, Abst. 2290. Further hybridizations, including three-way crosses and double crosses, are in progress with local inbreds, *I<sub>5</sub>* and *L<sub>5</sub>*, and with a derivative from the African variety Sahara, known as *S<sub>23</sub>*.

368. BOSHI SEN.  
**More trials with hybrid corn.**  
Indian Fmg 1950 : 11 : 456-58.

Several maize hybrids developed at the Vivekananda Laboratory, Almora, Uttar Pradesh, and others imported from the USA (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 295) have outyielded T 41, one of the best open-pollinated Uttar Pradesh strains, in trials at several localities in India. US 13, VL 2 and VL 5 have consistently given high yields and are to undergo further testing.

369. MIÈGE, E.  
Les céréales en Afrique du Nord. Le maïs et le sorgho. **(The cereals in north Africa. Maize and sorghum).**  
Rev. Bot. Appl. 1951 : 31 : 137-58.

The history and development of maize and sorghum cultivation in northern Africa are

outlined. Local types of maize and sorghum in Algeria, Tunis and Morocco are mentioned with some general information on various species and on trends in breeding suitable varieties for conditions of soil and climate of northern Africa.

370. DE WET, J. D. and  
VAN VUREN, J. P. J.  
**Increase the maize yield per morgen.**  
Fmg S. Afr. 1951 : 26 : 231-35.

Pending the production of adequate supplies of hybrid maize seed in South Africa, seed selection by the farmer should be carried out. Use of fewer varieties is advocated and notes on recommended open-pollinated varieties are given. Methods of seed selection and collection are described; notes are also provided on exhibition standards for Hickory King and other varieties.

371. WORTMAN, L. S. and  
RINKE, E. H.  
**Seed corn injury at various stages of processing and its effect upon cold test performance.**  
Agron. J. 1951 : 43 : 299-305.

An analysis was made of the injury shown by seed maize at various stages of commercial processing and also of the effect of injury upon germination under cold conditions, using Minhybrid 408 and Hybrid "B." Two characteristics apparently influence performance in the germination test: susceptibility to physical injury during processing and potential germinative ability. Minhybrid 408 exhibited less injury during processing than Hybrid "B." The latter hybrid, however, possessed greater potential germinative capacity. Combination of both characteristics by breeding is desirable.

372. ROUNDS, W. T.,  
ROSSMAN, E. C.,  
ZURAKOWSKI, W. and  
DOWN, E. E.  
**Rate, method, and date of planting corn.**  
Quart. Bull. Mich. Agric. Exp. Sta. 1951 :  
33 : 372-87.

Experiments were carried out on the effects of rate, method and date of planting on yield, ear weight, maturity as indicated by moisture content, and lodging in maize hybrids. The yielding ability of a hybrid was an inherent characteristic that was independent of planting rate.

373. KVAKAN, P.  
Utjecaj zaperaka na visinu i dozrelost priroda kukuruza. (The effect of tillering upon yield and maturity of maize produce).  
Poljoprivredna Znanstvena Smotra, Zagreb 1950 : 12 : 35-50.

Experiments, conducted at Zagreb, with  $F_1$  hybrids between inbred lines, derived from one or several varieties, are described. The evidence suggests that maize yields are higher and that the ears reach fuller maturity when the plants are less widely spaced.

374. WERNHAM, C. C.  
**Cold testing of corn. A chronological and critical review.**  
Progr. Rep. Pa Agric. Exp. Sta. 1951 :  
No. 47 : Pp. 12.

A detailed review is given of literature on: (1) pathogens affecting seedling maize under adverse conditions; (2) factors other than disease organisms influencing reaction in tests of cold resistance using germinating seedlings; and (3) inheritance of resistance to cold and disease. Problems of breeding and testing for seedling resistance to cold are discussed.

375.  
**New Ga. hybrid corn suited to Piedmont area.**  
Crops and Soils 1951 : 3 : No. 8 : p. 28.

Georgia 103, a new white hybrid maize, has been released by the Georgia Agricultural Experiment Station. It is fairly resistant to lodging and is moderately tolerant of weevils. Georgia 103 has outyielded Hastings Prolific, Florida W-1 and Whatley's Prolific by 21, 22 and 35%, respectively.

376. WARREN, J. R.  
**The use of radioisotopes in determining the distribution of *Bacterium stewartii* Erw. Smith within corn plants.**  
Phytopathology 1951 : 41 : 794-800.

The results of experiments using an inoculum of *B. stewartii* containing  $P^{32}$  have shown that there is no difference in the rate or extent of distribution of the pathogen within maize inbreds which are resistant or susceptible to Stewart's disease.

377. KALININ, M. S.  
(New maize hybrids).  
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 12 : 61-63.  
[Russian].

Several new maize hybrids, which are being



tested by the USSR State Varietal Commission, are described.

Trials showed that the most productive intervarietal hybrids were those from crosses between dents and flints. The most promising of these, Donskoï [Don] (Belaja Zubovidnaja Harjkovskaja [White Dent Harjkov] x Voronežskaja 76 [Voronež 76]), Harjkovskiï [Harjkov] (Harjkovskaja 23 [Harjkov 23] x Voronežskaja 76), and Bukovinskiï 1 [Bukovina 1] (Voronežskaja 76 x Zubovidnaja 3135 [Dent 3155]), were bred at the Černovickaja Research Station, while Harjkovskaja 23 x Severo-Dakotskaja [North Dakota] was developed at Odessa. All these hybrids are remarkable for earliness and high yielding capacity.

New productive hybrids developed for the southern districts of the USSR include Krasnodarskii 4 [Krasnodar 4], bred at the Krasnodar State Breeding Station, and Kollektivnyi [Collective] developed at the Ukrainian Institute of Grain Farming. The former was obtained from Sterling x the interline cross Krasnodarskii 3. It yields 4 to 5 c. more kernels per ha. than Sterling and has other good economic characters. Kollektivnyi was bred from Minnesota 13 Extra x G380. It is more productive than its female parent and the intervarietal hybrid Rostovskii [Rostov] (Minnesota 13 Extra x Gruševskaja), and is less susceptible to blister smut than these varieties.

The hybrids under trial in 1949 included 28 high yielding double intervarietal crosses bred at the Kubanj Research Station of the USSR Institute of Plant Industry and at the Krasnodar State Breeding Station. Several of these, for instance, VIR 91, 96, 107, 99, 33 and 21, are as early as Harjkovskaja 23. Others reach maturity at the same time as Dnepropetrovskaja [Dnepropetrovsk]. The new double cross hybrids outyielded most of the old and new intervarietal hybrids and top crosses. Their yielding capacity was particularly high in the districts with ample rainfall. Reference is made to the following productive double intervarietal crosses: hybrids 2 and 5 bred at the Krasnodar State Breeding Station, and VIR hybrids 160, 49, 42, 37, 50 and 57. VIR 160 yielded 72-6 c. per ha. in the trials conducted in the Krasnodar territory and VIR 49 produced 78.3 c. per ha. in the trials in the Stavropolj territory.

The new double intervarietal hybrids show resistance to lodging and blister smut. Of the hybrids remarkable for their resistance to lodging, the VIR double crosses 37, 42, 49, 50 and 110 are mentioned. The double crosses

showing a high degree of resistance to blister smut include VIR 57 and Kubanskaja 135.

378. AMANO, Y.  
(**Polyploid cells in maize induced by a pathogenic fungus**).  
Jap. J. Genet. 1946: 21: 46-47. [Japanese].

Tetraploid, octoploid and higher polyploid cells have been observed in lesions caused by *Ustilago Zeae*.

379. VESTAL, E. F. and SEMENIUK, G.  
**Puccinia sorghi and Helminthosporium turcicum on corn in Iowa during 1950.**  
Plant Dis. Reporter 1951: 35: 212-14. (Mimeographed).

Data are given on the relative susceptibility of 28 inbred lines of dent maize to *P. Sorghi*.

380. WERNHAM, C. C.  
**Exposure to rots, smuts, blights and molds reveals disease resistant corn hybrids.**  
Science for the farmer. 63rd Annual Report of the Pennsylvania Agricultural Experiment Station 1951: Bull. No. 529: Suppl. No. 3: 5-6.

Methods in progress, at the Pennsylvania Agricultural Experiment Station, for breeding hybrid maize with resistance to leaf blight (*Helminthosporium turcicum*), smut, stalk rot (*Gibberella Zeae*) and corn borer are briefly described.

381. PATCH, L. H., DEAY, H. O. and SNELLING, R. O.  
**Stalk breakage of dent corn infested with the August generation of the European corn borer.**  
J. Econ. Ent. 1951: 44: 534-39.

The amount of stalk breakage and reduction in grain yield caused by *Pyrausta nubilalis* at Lafayette, Ind., varied among different maize hybrids. Breakage was greater among hybrids derived from Ill. R4, known to be susceptible to *Diplodia* stalk rot, than in several hybrids involving Ind. WF9, a stalk rot resistant inbred.

382. HALEVI, B.  
(**Experiments on the growing of irrigated maize**).  
Hassadeh 1951: 31: 264-65. [Hebrew].  
In a comparative trial of the maize varieties Shen hassus [Dent], 13, 21, P 300, V 595 and

V 692 grown under irrigation, Shen hassus produced the most ears, while the other varieties bore a larger number of grains per ear, thereby producing the heavier crops.

383. PENDLETON, J. W. *ET AL.*  
**Illinois tests of corn hybrids in wide use in 1950.**  
Bull. Ill. Agric. Exp. Sta. 1951 : No. 544 : 103-36.

Tabulated details of the performance of over 300 commercially grown maize hybrids are presented with a list of those giving highest yields in each area during the three years 1948 to 1950.

384. ROUSSEAU, M.  
Quelques résultats et considérations à propos de la culture du maïs grain en Belgique. (**Some results and considerations concerning the cultivation of maize for grain in Belgium**).  
Rev. Agric., Bruxelles 1951 : 4 : 442-50.

The value of maize as a grain crop and of hybrid maize cultivation for Holland and Belgium is considered in this account from the Melle Research Station. From the results of trials of American and Dutch varieties and an open-pollinated Belgian maize, Daknam, it seems likely that promising hybrid combinations adapted to local conditions in Belgium could be bred.

## BARLEY

385. KAPLAN, R. W.  
Chromosomen- und Faktormutationsraten in Gerstenkörnern bei verschiedenartigen Quellungsbehandlungen oder Kälte während oder nach der Röntgenbestrahlung sowie bei Dosisfraktionierung. (**Chromosomal and factor mutation rates in barley grains with varying soaking treatments or cold during or after X irradiation and with interrupted dosage**).  
Z. indukt. Abstamm.- u. VererbLehre 1951 : 83 : 347-82.

Barley grains were subjected to various combinations of X ray and cold treatments with and without soaking in water. Cooling at  $-65^{\circ}\text{C}$  had no mutagenic effect. Cooling after irradiation reduced the gene mutation rate by at most 1.9% and the chromosome mutation rate (measured by the degree of sterility) by at most 3.4%, which indicates that diffusion of charged molecules plays a relatively insignificant part in the mutation process.

Soaking in water for 6 hours before irradiation increased the frequency of both types of mutation significantly; longer periods of soaking increased it still further, roughly in proportion to the duration. Soaking in water saturated with  $\text{CO}_2$  reduced the chromosomal mutations by about  $\frac{1}{3}$ , whereas the gene mutations were either increased or unaffected; soaking in 0.5% acetic acid solution on the other hand doubled the number of chromosomal mutants without altering the number of gene mutations.  $\text{NH}_3$  reduced the chromosome mutation, though not so effectively as  $\text{CO}_2$ .

Soaking for 6 hours after the seeds had been irradiated caused a significant reduction in chromosome mutants.

When the same total irradiation was applied in interrupted doses, the number of chromosome mutations rose with increasing intervals of rest between the doses, whereas the number of gene mutations remained unaffected.

These results support the view that chromosome and gene mutations are distinct phenomena, a conclusion which is corroborated by the difference in their dose relationships, the former being generally multiple-hit and the latter single-hit phenomena. Certain minute chromosomal changes may, however, behave as gene mutations; the different reaction of the two groups to chemicals suggests that the chromosome may be longitudinally differentiated, one section being sensitive to  $\text{CO}_2$  or acetic acid and more prone to give chromosome than gene mutations, the other being insensitive to these substances and more prone to give gene mutations.

Differences, though not consistent, were noted in the degree of sterility in the short and long ears.

386. MATSUMURA, S.,  
MOCHIZUKI, A. and  
SUZUKA, O.  
(**Mutations in barley following X irradiation. I.**)  
Seiken Jiho (Biological Report) 1950 : No. 4 : 22-30. [Japanese].

A series of Japanese malting barleys were X-irradiated to obtain mutations. The mutation rate differed according to the variety. Most of the mutants were chlorophyll aberrations, principally virescent types; vigour was almost invariably impaired. Other mutations resulted in sterile ears, compact spikes, dwarf habit or lateness. Most of the mutants were simple recessives. Sterile ear and yellow striping appeared to be linked characters, also sterile ear and white seedling.



387. ÅSANDER, F.  
Svalöfs Eddakorn II. (**The Svalöf barley Edda II**).  
Allmänna Svenska Utsädesaktiebolaget  
(General Swedish Seed Co.) Svalöf  
1951 : 28-31.

This new line selection from Edda was put on the Swedish market in 1951. Trials in various localities in Sweden from 1940 to 1946 show that Edda II is somewhat superior in yield to Edda I and has also a more uniform type of ear with larger kernels of better quality, while retaining the strong straw of Edda I. Both varieties require the same conditions of cultivation.

388. MECHELKE, F.  
Ein Fall natürlicher Triploidie und vereinzelter Ringchromosomenbildung bei *Hordeum spontaneum* Koch. (**A case of natural triploidy and occasional formation of ring chromosomes in *H. spontaneum* Koch.**).  
Z. indukt. Abstamm.- u. VererbLehre  
1951 : 83 : 442-46.

Examinations of a number of seedlings of *H. spontaneum* var. *eusporaneum* revealed one of them to be a triploid, some meioses of which showed the presence of a ring of four involving the SAT chromosome.

389. COVAS, G.  
Nuevo *Hordeum* hexaploide indígena en la Patagonia. (**A new hexaploid *Hordeum* indigenous in Patagonia**).  
Rev. Argent. Agron. 1951 : 18 : 74-77.

A description is given in Latin and Spanish of *H. Parodi*, with indications of how it differs from the other two hexaploid species *H. Lechleri* and *H. hexaploidum* and its relationships with the diploid species *H. stenostachys* and the tetraploid *H. nodosum*.

390. CAUDERON, A.  
Étude de l'hérédité de trois couples de caractères morphologiques chez l'orge cultivée. (**A study of the inheritance of three pairs of morphological characters in cultivated barley**).  
Ann. Inst. Nat. Rech. Agron., Paris  
1951 : Sér. B. : 1 : 9-19.

The results of eight crosses of cultivated barleys indicate that each of the character pairs hairy *v.* glabrous sheath (*Hs*), glabrous *v.* hairy furrow of the upper palea (*Sg*), and long *v.* short awns (*Ex*) is monofactorially conditioned. For the first named character the author has used the symbol *Hs* (hairy sheath) already described (cf. *Plant Breeding Abstracts*, Vol. XVII, Abst. 1646), while awaiting confirmation that these

two genes are identical. *Hs*, *Sg* and *Ex* appear not to be linked with *V*; and *Sg* also shows no linkage with *S*.

391. KUMP, M.  
Nasljeđivanje brojnosti koljenaca na klasnom vretenu ozimog golog i obuvenog ječma (*Hordeum distichum* Jess.) i prirod zrna. [**The inheritance of the number of ear nodes in connexion with the hulled and naked kernel types of two-rowed winter barley (*H. distichum* Jess.) and the yield of grain**].  
Poljoprivredna Znanstvena Smotra, Zagreb 1950 : 12 : 141-62.

Two-rowed hulled winter barleys have a larger number of articulations in the ear than the two-rowed naked winter barley varieties. The inheritance of this character in connexion with hulled and naked kernel types was studied at the Plant Breeding Institute, Zagreb, in the  $F_1$ ,  $F_2$  and  $F_3$  from crosses between the following two-rowed winter barleys: naked 60 x hulled 160, naked 71 x hulled 333 and naked 232 x hulled 45.

The larger number of articulations of the hulled varieties proved dominant in the  $F_1$ . The  $F_2$  showed extensive segregation in respect of the number of articulations. The wide range of variation in the  $F_2$  suggested that the number of articulations is a polymeric character. High degrees of correlation were established between the large number of articulations and the hulled genotype on the one hand, and the small number of articulations and the naked genotype, on the other. The correlation coefficients for the three crosses made were  $r = +0.56$ ,  $r = +0.56$  and  $r = +0.67$ , respectively. The correlation is attributed to linkage.

It is concluded that by crossing a two-rowed naked winter barley having few articulations with a two-rowed hulled barley having many articulations a productive variety of naked barley having a large number of articulations may be obtained.

392. BELL, G. D. H.  
**Barley breeding and related researches.**  
J. Inst. Brew. 1951 : 57 : 247-60.

In comparison with the techniques used in wheat breeding involving intergeneric hybridization and the induction of polyploidy, it is emphasized that all cultivated barleys have had a restricted origin, probably being derived from a form resembling the six-rowed brittle eared *Hordeum agriocrithon*. Hybridization and

mutation have occurred without development of cytological or genetical barriers; thus there is complete interfertility within the genus. Chromosome doubling has occurred spontaneously only in species used for forage. Polyploid grain types have been produced by artificial means but their use is limited by impaired fertility.

Development of two-rowed spring barleys at the Cambridge Plant Breeding Institute, England, is traced from the introduction of Plumage-Archer and Spratt-Archer early this century, showing the importance of crosses with Kenia from which early and midseason selections have been obtained, having the short straw and high yield of Kenia combined with the desirable malting quality of Spratt-Archer and Plumage-Archer. More recently a wide series of crosses has been made involving promising continental introductions; care has been taken to avoid introducing disease susceptibility. Hybridization concerned with the development of winter hardy varieties is briefly described. A comparison is made between the high percentage of winter killing observed in the progeny of the hardy Pioneer back-crossed to Spratt-Archer, in an attempt to improve malting quality, and the complete winter hardiness of the offspring from Pioneer crossed with a Stadler's x Spratt-Archer selection.

The possibilities of maintaining or improving the present yield and malting quality of barleys are discussed with reference to the increased use of combine harvesters; the latter require early maturing varieties with short strong straw and freedom from ear shattering and grain shedding when dead ripe.

393. NAKAO, S.  
(On waxy barley).

Seiken Jiho (Biological Report) 1950 : No. 4 : 111-13. [Japanese].

Three Japanese naked barley varieties, vars. *violaceum*, *sikangense* and the newly described var. *purpureum*, have waxy or glutinous endosperms, staining reddish brown with iodine. In crosses between var. *violaceum* and var. *coeleste*, waxy endosperm is inherited as a simple recessive character.

394. NAKAO, S.  
(The distribution of barley varieties in the 4 prefectures of the Kinki district. Report on the barley collection, II.).

Seiken Jiho (Biological Report) 1950 : No. 4 : 149-52. [Japanese].

The botanical varieties of hulled and naked barley occurring in the region around Kyoto are

listed. Three new hulled barleys, vars. *alatum*, *subalatum* and *subasiaticum*, and three new naked barleys, vars. *nudialatum*, *subnudialatum* and *kyotoense*, are described.

395. BRÜCHER, H. and  
ÅBERG, E.

Die Primitiv-Gersten des Hochlands von Tibet, ihre Bedeutung für die Züchtung und das Verständnis des Ursprungs und der Klassifizierung der Gersten. (The primitive barleys of the highlands of Tibet, their importance for breeding and for understanding the origin and classification of barleys).

Kungl. LantbrHögskolans Ann. 1950 : 17 : 247-319.

A collection of 2800 samples of *Hordeum vulgare* found in the Himalayas, in Sikkim and southern Tibet, has been studied for many years under European conditions. Naked barleys constituted 95% of all the samples, and 55% were dark-grained varieties and 27% had dark glumes. Hooded barleys represented 5% of the total, and short awned types 10%, while *intermedium* forked as well as aberrant *trifurcatum* types of awns were also found. In addition to descriptions of the 47 biotypes identified in the collection, detailed notes are given on the distribution and incidence of hereditary characters such as colour of ear and grain, the six-rowed condition and the types of awn, glume characteristics, brittleness of the ear, considered specially in connexion with the *H. agriocrithon* problem, leaf shape, strength of straw, earliness and resistance to disease and frost. The importance of Central Asia as a centre of origin of the cultivated barleys is, in the authors' opinion, greater than had been supposed.

Problems in barley classification are discussed and a system is proposed based on only three systematic categories, namely, the species, variety and biotype, the latter receiving no Latin name.

396. KUMP, M.

Nasledivanje brojnosti provodnih snopica u vlati ozimoga golog i obuvenog ječma (*Hordeum distichum* Jess.) i otpornost prema polijeganju. (Inheritance of vascular bundles in the stems of hulled and naked two-rowed winter barley (*H. distichum* Jess.) and its resistance to lodging).

Poljoprivredna Znanstvena Smotra, Zagreb 1950 : 12 : 117-39.

Naked barleys have smaller numbers of vascular bundles than hulled varieties. The inheritance



of this character in connexion with hulled and naked kernel types was studied at the Institute of Plant Breeding, Zagreb, in the  $F_1$ ,  $F_2$  and  $F_3$  from crosses between the following two-rowed winter barleys: naked 63 x hulled 160, naked 84 x hulled 333 and naked 65 x hulled 45.

The larger number of vascular bundles of the hulled varieties proved dominant in the  $F_1$  and the variation and segregation in the  $F_2$  suggested that the number of vascular bundles is a polymeric character.

There was a high degree of correlation, attributed to linked factors, between high number of vascular bundles and the hulled genotype and low number of vascular bundles and the naked genotype. The correlation coefficients were  $r = +0.57$ ,  $r = +0.65$  and  $r = +0.42$  for the three crosses, respectively.

Some naked genotypes of barley with a large number of vascular bundles in the stem were obtained from the crosses between naked genotypes having a small number of vascular bundles and hulled varieties with a large number of vascular bundles. It is expected that the new material will be more productive and will show a higher degree of resistance to lodging than the existing varieties of naked barley.

397. ARNY, D. C.  
**Inheritance of resistance to spot blotch in barley seedlings.**  
Phytopathology 1951 : 41 : 691-98.

Susceptibility to spot blotch (*Helminthosporium sativum*) depended upon a single dominant gene; susceptibility was detected only in Lion and some of its derivatives. No association was found between any of the marker genes for seven linkage groups and the factor pair governing reaction to spot blotch. Possibly the latter pair was located too far from the different markers for any association to be detected with the small populations used. In the cross Lion x Oderbrucker susceptibility to spot blotch appeared to be associated with resistance to stripe (*H. gramineum*).

398. FRÖIER, K.  
Erfarenheter rörande Svalöfs kornsorter i försök och praktiska odlingar. (**Experience regarding Svalöf varieties of barley in trials and practical farming**).  
Allmänna Svenska Utsädesaktiebolaget (General Swedish Seed Co.) Svalöf 1951 : 25-28.

Short notes are given on the value of many well

known Svalöf varieties of barley, considered from the standpoints of their performance in various trials and their use in practical agriculture, as well as their suitability to different regions in Sweden. The origin of many of the varieties, including two-rowed and six-rowed forms, is given.

## MILLETS AND SORGHUM

399. BURTON, G. W.  
**Quantitative inheritance in pearl millet (*Pennisetum glaucum*).**  
Agron. J. 1951 : 43 : 409-17.

The results of inheritance studies of numerous pearl millet selections and their  $F_1$  hybrids interplanted with their  $F_2$  progenies at Tifton, Ga., indicate that heterosis was apparent in respect of plant height, length of internode, stem diameter, length of inflorescence and yield. A minimum of one gene was estimated to be involved in the inheritance of inflorescence length and leaf width, but other quantitative characters appeared to be controlled by two to eight genes acting in an additive or geometric manner. Positive correlations between numerous characters are listed.

400. LOWIG, E. and EBNER, A.  
Untersuchungen über einige Werteeigenschaften des Hirsekornes. (**Investigations on some valuable characteristics of millet grain**).  
Mitt. Inst. Pflanzenb. Pflanzenz. Landw. Hochsch. Hohenheim 1944 : No. 2 : Pp. 11.

Formenkreise of *Setaria italica*, *Panicum frumentaceum* and *P. miliaceum* were studied. The tabulated results show the variation within the Formenkreise in weight of 1000 grains and of 1000 glumes, in percentage of glumes and percentage of crude protein and of crude fat in 1000 grains.

401.  
**Three new plants look good for pasture in Mississippi tests.**  
Crops and Soils 1951 : 3 : No. 9 : p. 29.

A comparison is made of the performances of the following recent introductions: a Nigerian millet, named Sanyo, which is more leafy for a longer period than pearl millet; the fine stemmed leafy Pekenne sorghum from Chile; and P1-156549, another fine stemmed sorghum, from Rhodesia. Although Sanyo millet appears

to be disease resistant under Mississippi conditions, both sorghum varieties have only moderate resistance to the common diseases.

402.

**New dwarf kafirs gain large acreage in Okla.**

Crops and Soils 1951 : 3 : No. 9 : p. 31.

Two dwarf sorghums, Redlan Kafir and Combine White 44-14, developed in Oklahoma, are recommended to growers throughout the state. Both varieties produce high yields of grain.

403. STEPHENS, J. C.

**The  $Y V_{11} G_2$  linkage group in sorghum.**

Agron. J. 1951 : 43 : 382-86.

Data concerning linkage of factor pairs for two chlorophyll deficient types with one of the pairs determining seed colour have been accumulated from miscellaneous populations over several years and from numerous crosses undertaken at the Texas Agricultural Experiment Station. The genes controlling red or white seed colour,  $Yy$ , are linked with a factor pair for green or golden plant colour,  $G_2g_2$ , and with a pair for green or virescent yellow plant colour,  $V_{11}v_{11}$ . The average cross-over percentage between  $y$  and  $g_2$  is  $9 \pm 0.5$  and that between  $y$  and  $v_{11}$  is  $6 \pm 0.5$ . No  $v_{11}v_{11}g_2g_2$  plants have been observed. Although the order of genes is as yet uncertain, it is thought to be  $y v_{11} g_2$ .

Cross over percentages for factors of the  $yv_{11}g_2$  group segregating with other characters provide little evidence for any linkage.

404. KOHLE, A. K.

**Study of correlations of East Kandesh jowars (*Andropogon sorghum*).**

Poona Agric. Coll. Mag. 1951 : 42 : 10-14.

Data on simple correlations of characters in several sorghum varieties reveal that the greater the plant height, number of internodes, stem circumference, and length, thickness and weight of ear, the greater is the yield of grain and fodder. The characters studied vary considerably within each variety; thus scope for selection is provided.

405.

**Broom corn . . . crop with a future.**

Crops and Soils 1951 : 3 : No. 8 : 16-17.

Progress is being made in Illinois towards developing a variety combining the following characters: improved type of panicle; tan plant colour associated with anthracnose resistance;

juicy stalks to provide forage after the heads have been harvested; and seed for livestock.

406.

AHARONOVITZ, J. [AHARONOVITS, Y.], and BERKOVITZ, J. [BERKOVITS, Y.].

**(Experiments in sorghum growing). Hassadeh 1951 : 31 : 208-11. [Hebrew].**

Of the 18 sorghum varieties tested in five different localities in Israel the highest yields came from Plainsman, when grown under good soil conditions. High yields were also obtained from Hegari, Early Hegari, waxy sorghum and Milo 38. Martin, Kalo and Sooner are suitable for combine harvesting. The latest variety was the bitter brown-seeded introduction referred to as Sharuk.

407.

COTTE, A.

Sorghos à grain, sorghos sucrés et Sudan-grass. De leur intérêt pour l'agriculture méridionale. **(Grain sorghums, sweet sorghums and Sudan grass. On their interest for southern agriculture).** Ann. Inst. Nat. Rech. Agron., Paris 1951 : Sér. B. : 1 : 34-76.

Following the lines of a previous account (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 345) the present paper deals with the following aspects of the investigations in progress at Montpellier to test the value of grain and sweet sorghums and of Sudan grass for southern France: the sorghums of the world and of France, including the Montpellier collection; cultivation and variety trials; the developmental cycle of sorghum; the toxicity of sorghums and their industrial use.

Similar information is given in recording Sudan grass trials, which are also in progress on a comparatively small scale at Montpellier (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1655).

## RICE

408.

KUANG, H. H.

**Studies on rice cytology and genetics as well as breeding work in China.** Agron. J. 1951 : 43 : 387-97.

A detailed account is given of rice breeding and associated cytological and genetical investigations carried out by Chinese workers since 1919. The future breeding programme includes crossing cultivated varieties with wild rice and closely related genera, inducing mutations by irradiation or treatment with colchicine and other chemicals, developing male sterility in



order to produce hybrid rice, and increasing resistance to floods and frost.

409. KOLBÉ, F.

**Rice cultivation in South Africa.**

Fmg S. Afr. 1951 : 26 : 181-83, 193.

Mention is made of UVS 1, a rice variety recently developed in Natal, and the Hungarian variety DS 1. The former requires a long hot growing season and has given the most satisfactory results under irrigation. The latter must be grown under water; it matures in three and a half months and does not shatter.

410.

**International Rice Conference.**

Wkly Summ. Natural Resources Sect.  
Gen. Hdqrs Allied Powers, Japan 1951 :  
No. 292 : 17-30. (Mimeographed).

The proceedings of the second FAO conference, held in Bogor, Indonesia, during April 1951, are summarized. The following were among the subjects dealt with by the Rice Breeders' Working Party: breeding in member countries during the previous year; hybridization recently undertaken in India to combine the response of *japonica* rice to fertilizer with the hardiness and adaptation to tropical countries of *indica* varieties; modern plant breeding methods, including the possible value of secondary selection of apparently pure lines; progress in compiling the World Catalogue of Genetic Stocks (cf. Abst. 420); cultural investigations as a complement to breeding; the relation of the expanded Technical Assistance Programme to work on rice breeding; coordination and training in breeding; national seed production and distribution policies. The general recommendations of the Rice Breeders' Working Party are listed. The topics dealt with by the Working Party on Fertilizers included varietal response to fertilizers.

411. HARA, S.

**(Linkage between genes for pigmentation and sterility in rice).**

Jap. J. Genet. 1946 : 21 : p. 32. [Japanese].

In the  $F_4$  of the cross Sekitori [Champion] x Early Omachi, linkages were discovered between the following genes: *sf* (male sterility) and *am* (glutinous endosperm), 5.3 units; *ssh* and *am*, 9.9; *sf* and the chromogene *C*, 18.9; and *am* and *C*, 21.7. In another cross, a linkage value of 6.8 was found between the genes *sk* (semi-sterile offtype) and *Pl* (green coloration).

412. VAN DER MEULEN, J. G. J.

**Rice improvement by hybridization and results obtained.**

Contr. Gen. Agric. Res. Sta., Bogor  
1950 : No. 116 : Pp. 38.

Methods of hybridization in Indonesia (cf. *Plant Breeding Abstracts*, Vol. XIII, Abst. 182) with awned (bulu) and awnless (tjereh) varieties are outlined. A large number of selections from the  $F_4$  of an awnless cross, Tjina x Latl, show wide variations in photoperiodic reaction, yielding capacity, date of maturity, grain quality, degree of shattering and lodging and other characteristics. Among the promising selections, Bengawan, Mas, Intan, Fadjar, Pelopor, Salak and Tjahaja have proved successful in many regions; an average increase of 25% is expected from those most suitable for particular areas in Java and Madura.

413. MORINAGA, T. and

FUKUSHIMA, E.

**(Cytogenetic studies on species and the offspring of interspecific hybrids in *Oryza*).**

Jap. J. Genet. 1946 : 21 : 35-36. [Japanese].

Meiosis is described in (*O. sativa* x *O. minuta*) x *O. sativa*, (*O. sativa* x *O. latifolia*) x *O. sativa* and the  $F_2$  of *O. sativa* x *O. latifolia*. Figures are given of metaphase configurations in the first and last crosses mentioned, showing  $12_{11} + 24_1$  chromosomes.

414. HOOVER, A. A. and

JAYASURIYA, G. C. N.

**Nutritional aspect of pureline paddy.**

Trop. Agriculturist 1951 : 107 : 9-14.

Protein and vitamin contents were determined in brown rice samples of 18 varieties. Marked differences in protein and thiamin contents were obtained, probably due to genetical and environmental factors. The protein and vitamin contents of three varieties with white pericarp compared favourably with the average values for all samples. Riboflavin and niacin values showed no appreciable variation. No correlation was found between maturation period and protein or vitamin content.

415. MISRA, G.

**Photoperiodic response in some early varieties of paddy.**

Curr. Sci. 1951 : 20 : 209-10.

Significant delays in time of earing were observed in four early maturing rice varieties

grown under naturally prevailing high temperatures in Cuttack, India, and subjected to short photoperiods of 10 hrs. when 18 days old. Varieties differed slightly in their response but delay was increased in all varieties by exposure to short photoperiods up to the time of heading. Total suppression of ear emergence was observed in 50% of the T 136 and TN 22 plants but in only 21% of Ch. 10. Although reaction to short photoperiods is a varietal characteristic it is suggested that each variety may be a mixture of strains which were at different developmental stages at the time treatment was begun or which differ in response to prolonged treatment; thus ear emergence was suppressed in a certain percentage of plants only.

416. NILES, J. J.  
**Hybridization methods with paddy.**  
Trop. Agriculturist 1951 : 107 : 25-30.

The emasculation technique found most satisfactory at Peradeniya, Ceylon, consists of treatment of the panicle with warm water for 10 minutes to cause elongation of the stamen filaments, followed by clipping off the anthers and upper halves of the glumes in one operation, and bagging. Methods found useful in pollination, and a technique of germinating  $F_1$  seed which gives nearly 100% germination and which is based on Mendiola's method, are also described.

417. MIZUSHIMA, U.  
**Study on sexual affinity among rice varieties, *Oryza sativa* L. II. Analysis of affinity of other Asiatic and Hawaiian varieties.**  
Tohoku J. Agric. Res. 1950 : 1 : 151-60.

Investigations concerning the interrelationships of 44 strains of rice from China, Indo-China, India, the Philippines and Hawaii are reported from Tohoku University. Affinity was measured by the degree of compatibility in respect of percentage seed set and normal pollen, observed in the  $F_1$  hybrids obtained by crossing the 44 different types with ten rice strains, belonging to both *japonica* and *indica* groups, whose compatibility relationships were already known. By separating those rices with similar relationships, a classification into six groups was effected; these groups showed a continuous variation in affinity with the ten standards, rather than a definite incompatibility or compatibility relationship with the *japonica* and *indica* types formerly supposed to be mutually incompatible.

418. MORINAGA, T. and KURIYAMA, H.  
**(The effect of hybridization on the year by year improvement in the fertility of autotetraploid rice).**  
Jap. J. Genet. 1946 : 21 : 81-83. [Japanese].

A steady improvement in the fertility of five autotetraploid families is recorded. By intercrossing these families, fertility was increased still further.

419. PIACCO, R.  
**La razze di riso coltivate in Italia. (The varieties of rice cultivated in Italy).**  
Risicoltura, Vercelli 1951 : 39 : 88-114, 133-67, 192-202.

This is a continuation of the series already referred to in *Plant Breeding Abstracts*, Vol. XXI, Abst. 1889.

420. **World catalogue of genetic stocks.**  
Rice. Supplement No. 1. FAO, Washington, D.C. 1951 : Pp. 29. (Mimeographed).

Additional data, received from plant breeders and experiment stations concerning genetic stocks which have become available as breeding material since the first issue of this catalogue (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2351) was published, are presented.

421. MIÈGE, E.  
**La question du riz au Maroc. (The question of rice in Morocco).**  
Rev. Bot. Appl. 1951 : 31 : 294-312.

CHEVALIER, A.  
**Le riz a-t-il un grand avenir en Afrique occidentale? (Has rice a great future in West Africa?)**  
Ibid. 1951 : 31 : 321-22.

In discussing the question of suitable varieties of rice for cultivation in Morocco, the first author reviews briefly the experience of various European countries in regard to the choice and production of suitable types for their respective climatic and other conditions, and he names some European rices that appear likely to be suitable for Morocco. Varieties from Spain, Portugal and Italy, and also from Madagascar seem to be the most promising.

The second paper discusses in more general terms the same problems of adaptation and the choice of suitable varieties for French West Africa.



422. SAKAI, K.  
**(Hypertrophy of the rice tapetum, with special reference to its significance for breeding for resistance to cold).**  
 Jap. J. Genet. 1946 : 21 : 68-69. [Japanese].

A comparative study of Japanese varieties has shown that hypertrophy of the tapetum provides an index of susceptibility to low temperature. Hypertrophy of the tapetum is closely correlated with subsequent sterility.

423. CHIAPPELLI, R.  
 Prove di orientamento delle nuove varietà di riso. **(Preliminary trials of new varieties of rice).**  
 Riscicoltura, Vercelli 1951 : 39 : 174-78.

Rice trials in various provinces in Italy are reported. The varieties 316, 317 and 321 proved superior to Chinese Originario in quality and size of grain. They are suitable to northern regions where Americano 1600 [American 1600] and Chinese Originario do well. In an experiment with 316 and the strains 82 and 148, 317 alone was attacked by brusone; strain 82 was the most resistant to lodging.

424. CALMA, V. C.,  
 REYES, F. C. and  
 DE LA CRUZ, M.  
**Tests of selected strains of Elon-elon and Guinangang.**  
 Philipp. Agric. 1950 : 34 : 42-45.

Data are given on trials of selected strains of two rice varieties, Guinangang and Elon-elon, at Los Baños, Philippines. Among the Guinangang strains, 311 produced a significantly greater number of bearing culms per hill than other strains, but 426 gave the highest grain yield. Elon-elon strains 473 and 101 showed their superiority in grain yield and low percentage of empty grains.

## OTHER CEREALS

425. SAUER, J. D.  
**The grain amaranths : a survey of their history and classification.**  
 Ann. Mo. Bot. Gdn 1950 : 37 : 561-632.

An ethnological and botanical survey of the *Amaranthus* species cultivated for grain during ancient and modern times in the New and Old Worlds is presented; and the grain species and closely related wild and weed species are classified. The conclusion is reached that the cultivated species all originated in the New World. A sharp taxonomic separation exists

between the cultivated species and their wild relatives; this was unexpected since hybridization within the genus is known to be frequent. Possibly the discontinuity is due to the almost universal practice of selecting pale seeds for planting. Elimination of dark seeds would be an effective barrier against introgression from wild species, which are without exception dark-seeded. The antiquity of the crop in the New World is indicated by several lines of evidence. The question whether the crop reached Asia before the European expansion cannot be answered with any certainty.

426. MIMEUR, G.  
 Systématique spécifique du genre *Coix* et systématique variétale de *Coix lacrymajobi*. Morphologie de cette petite céréale et étude de sa plantule. **(Systematic classification of the species of the genus *Coix* and the systematic classification of the varieties of *C. lacrymajobi*. Morphology of this small cereal and a study of its seedling).**  
 Rev. Bot. Appl. 1951 : 31 : 197-211.

A diagnostic key for the species of *Coix* is given with observations on the morphology of the inflorescence, on androgyny in *C. Lacryma-Jobi*, and on the anatomy and germination of the seedling.

## FORAGE GRASSES

427. Memoria de la tercera reunión de plantas forrajeras, 3 y 4 de octubre de 1950 en la Estación Experimental Rafaela. **(Report of the third meeting on forage plants, 3 and 4 October 1950 at the Rafaela Experiment Station).**  
 Minist. Agric. Ganad. Nación, Argentina 1950 : Pp. 211. (Mimeographed).

Among the many contributions contained in the report, the following are of most interest to plant breeders.

Covas, G. Estado de los trabajos de mejoramiento en alfalfa que se conducen en el Instituto de Fitotecnia (Castelar). **[State of the work on lucerne breeding carried out at the Plant Breeding Institute (Castelar)].** (pp. 45-49).

In 1947 some 10,000 selected plants were infected with nematodes and over 100 survived; from these the most resistant of all were used to produce synthetic varieties and commercial

hybrids, using 2500 plants from 50 different clones as seed producers. The seedlings produced contain some 24% of susceptible plants, which were removed after artificial infection; in this way a highly resistant population has been produced which is also distinguished by greater rapidity of winter sprouting.

In the discussion, the author reiterated the advantages of having a large number of clones for making the polycross; other speakers emphasized the desirability of maintaining the stands for as many years as possible, to enable natural selection to occur for resistance to other adversities, to which the author replied that early types with rapid growth are also desirable, particularly for certain areas.

Rojas, F. A. *Observaciones sobre el comportamiento de alfalfas cultivadas en la colección de Manfredi durante los años 1948/49 y 1949/50. (Observations on the behaviour of lucernes cultivated in the collection at Manfredi in the years 1948-49 and 1949-50).* (pp. 51-57).

A report is given of the behaviour of a number of introduced strains and hybrids, including *Medicago falcata* x *M. varia* hybrids obtained from Canada.

The desirability of maintaining adequate collections of clones and making them available to all workers was emphasized in the discussion.

Leiboff, R. O. *Cruzamiento artificial en sorgos. (Artificial crossing in sorghums).* (pp. 77-83).

When emasculation was carried out with hot water by the method of Stephens and Quinby (cf. *Plant Breeding Abstracts*, Vol. XIII, Abst. 658) and pollination effected 48 hours later, good sets of hybrid seed were obtained.

It was pointed out in the discussion that the method is suitable for breeding work but not for genetical studies.

Villar, A. D. *Mejoramiento de sorgos forrajeros. (Improvement of fodder sorghums).* (pp. 85-89).

Selection 4198, a line of the *Sorghum splendidum* or *S. Drummondii* type, has proved superior to all others tested in respect of yield of green matter and is lower in content of durrhin. Selection 4203, of the *S. sudanense* type, has finer stems and is leafier than the rest but has a somewhat higher durrhin content. Several sweet sorghum selections are promising and some selections of *S. alnum* are very leafy and free from rhizomes, but have relatively high cyanide contents.

In the discussion it was stated that plants free from rhizomes often segregate in their selfed progeny, giving rise both to plants with and without rhizomes.

Briggiler, H. A. *Estado actual de los trabajos de selección por bajo contenido de durrhina en sorgos, llevados en la Estación Experimental Nacional de Rafaela. (Present state of work on breeding for low durrhin content in sorghum carried out at the National Experimental Station of Rafaela).* (pp. 91-97).

By a system of team work in which over 1000 analyses can be made per day, using sodium picrate paper, selections for low cyanide content were made in *S. sudanense*, *S. saccharatum* and *S. caffrorum*. After five generations of selfing, all lines of the first two species lost vigour and attempts at restoring this by crossing the selected plants among themselves were not successful. No selections of *S. caffrorum* with low cyanide content were found.

Burkart, A. *Floración del kikuyo (Pennisetum clandestinum) en La Plata. [Flowering in P. clandestinum in La Plata].* (pp. 123-26).

The peculiarities of floral development in this species are described. The discussion centred on the merits and defects of the species as a fodder plant.

Rojas, F. A. *Observaciones sobre el comportamiento de una colección de leguminosas forrajeras que se conducen en la Estación Experimental de Manfredi. (Observations on the behaviour of a collection of forage legumes which are being made at the Manfredi experimental station).* (pp. 133-43).

Bentancur, M. *Primer comunicado sobre el comportamiento de diversas forrajeras procedentes de EE.UU. y la Argentina. (First communication on the behaviour of different forage crops introduced from the USA and Argentina).* (pp. 159-79).

The respective merits of a large number of species are discussed.

Rosengurtt, B. *Introducción e intercambio de material. (Introduction and exchange of material).* (pp. 205-07).

The importance of representative collections of forage plants, of accuracy in their classification and of collaboration between stations in the work of maintenance and exchange is once more emphasized, and a committee was set up to look into the matter further.



428. DAWSON, R. B.  
**The St. Ives Research Station. The story of 21 years' work on turf research.**

Sci. Hort. 1950-51 : 10 : 1-15.

An outline of work at this station in Yorkshire mentions trials with numerous indigenous European and New Zealand strains of *Agrostis*, *Lolium* and *Festuca* from which commercially acceptable types were selected.

429. SCHAEPMAN, H.

Enkele aspecten uit de grassenveredeling. (Some aspects of grass breeding).

Studiekring voor Plantenveredeling (Plant Breeding Study Circle) 14 December 1950 Wageningen : 342-55. (Mimeographed).

Natural selection and the occurrence of ecotypes play an important role in providing material for grass breeding. Opinion is divided on the desirability of using a uniform or a highly variable variety. The best method, theoretically, is to grow a number of different subvarieties and mix the seed mechanically. Progeny testing is important and for this the polycross method is best, using a clone instead of a plant as the unit.

Rust resistance in timothy may be positively correlated with winter hardiness. The mode of inheritance of rust resistance is probably more complicated than Roemer and Rudolf have suggested.

430. BROWN, W. V.

**Chromosome numbers of some Texas grasses.**

Bull. Torrey Bot. Cl. 1951 : 78 : 292-99.

The results of cytological observations, including chromosome counts, of 44 species comprising 24 native and introduced genera are reported; these include 25 chromosome numbers previously unrecorded.

431. HEDIN, L. and  
 LEFEBVRE, J.-M.

Morphologie et perméabilité des enveloppes de Graminées. (Morphology and permeability of the envelopes of Gramineae).

Ann. Inst. Nat. Rech. Agron., Paris 1951 : Sér. B. : 1 : 125-33.

In this anatomical and histological study of grass glumes mention is made of the effect which the type of glume may have in natural selection. On germination capacity, no effect was found in the species examined.

The glumes of *Lolium perenne* and *Festuca pratensis* showed marked analogies, whereas the glumes of *Bromus inermis* differed distinctly from those of *Brachypodium pinnatum*, a species formerly placed in the genus *Bromus*.

432. TEREÑOŽKIN, I.

**(The problem of improving the pastures and meadow lands of the Southeast).**

Socialističeskoe Seljskoe Hozjaistvo (Socialistic Agriculture) 1951 : No. 3 : 26-34. [Russian].

In trials at various Soviet institutes, the most recent of which were conducted at the Karaganda Research Station, an *Agropyron* variety derived from a wild *A. desertorum* form proved more productive and showed higher resistance to drought and soil salinity than an *A. cristatum* variety.

Several wild forage plants found in the arid south-eastern provinces of the USSR, regarded as promising breeding material, are listed. They include *Agropyron* spp., *Bromus*, yellow and blue lucernes and *Kochia prostrata*.

433. NIELSEN, E. L. and  
 SMITH, D. C.

**Dimorphic panicle formation in *Poa pratensis*.**

Bot. Gaz. 1951 : 112 : 534-35.

In a grass breeding nursery at Madison, Wisconsin, 16 specimens developing from a single panicle of *P. pratensis* obtained from Mount Vernon, Washington, produced panicles at two distinct levels. The upper layer was carried on long rachides, while a second layer of panicles seldom exceeded leaf height. Approximately 91% of the progeny of individual panicles harvested from the two levels retained this dimorphic habit; the frequency of off types was not significant, either in respect of progenies from individual panicles or when plants from both panicle levels were considered. Apart from the dimorphic panicle formation, plants were typical of the species.

434. MUSSER, H. B.

**Merion—a new bluegrass.**

Science for the farmer. 63rd Annual Report of the Pennsylvania Agricultural Experiment Station 1951 : Bull. No. 529 : Suppl. No. 3 : 1, 6.

A new low growing strain of Kentucky bluegrass, discovered on the Merion golf course at Ardmore, Pa., has been named Merion. It grows vigorously to form a dense turf which

can be cut closely and which resists invasion by other plants.

435. MANNER, R.  
Gullåkerhundäxing i jämförande försök.  
(**Gullåker cocksfoot in comparative trials**).

Medd. Gullåkers VäxtförädlAnst., Hammenhög 1950 : No. 5-6 : 95-102.

Breeding and trials of cocksfoot at the Gullåker Plant Breeding Station in Sweden are described with details of the performance of Gullåker cocksfoot there and at Svalöf. Gullåker, derived from Hammenhög 1, has finer stems, is more leafy, yields better quality hay and, being later than the parent variety, is better suited for growing as a mixture with other herbage plants.

In the 1937-49 at Gullåker, Gullåker cocksfoot surpassed all other Swedish strains on the market, being specially remarkable for the abundant second cut.

Some recent strains, 8491, 8489, 48-267 and 7396 are stated to have surpassed Gullåker and all other strains on the market; one of them is derived from colchicine-treated material.

436. REBISCHUNG, J.  
Auto et interfertilité chez le dactyle.  
(**Self fertility and interfertility in *Dactylis***).

Ann. Inst. Nat. Rech. Agron., Paris 1951 : Sér. B. : 1 : 20-33.

During 1947-49 fertility was studied in some plants from a population of cocksfoot from the Paris region. Highly self fertile plants were rare and in a certain environment plants derived from selfing were generally less self fertile than individuals from crosses between noninbred sister plants, which in turn were less self fertile than offspring from open pollination. Plants differing in degree of inbreeding, i.e.  $I_1$  inbreds or brother-sister hybrids, showed no evidence of significant differences in the amount of normal pollen that they produced.

From some results of a series of brother x sister crosses, among the  $I_1$  of a mother plant, it seems likely that a single factor difference may condition the various degrees of fertility to be expected from crosses of genotypically different pollen on the stigmas.

437. NEWELL, L. C.  
**Controlled life cycles of brome grass, *Bromus inermis* Leyss., used in improvement.**

Agron. J. 1951 : 43 : 417-24.

Inflorescence production can be induced by

subjecting clones to a preliminary period of short days and relatively cool temperatures of 60-75° F, during which abundant nitrogen is available, followed by long photoperiods. Under controlled conditions it is possible to cross selected clones which formerly developed panicles at different dates or produced only vegetative growth in the greenhouse.

438. SASS, J. E. and  
SKOGMAN, J.  
**The initiation of the inflorescence in *Bromus inermis* (Leyss.).**

Iowa St. Coll. J. Sci. 1951 : 25 : 513-19.

The initiation and early stages of development of the inflorescence were studied in seven clones with a view to elucidating problems of seed production. Flowering dates of the clones did not show the same order as dates of floral initiation. Observations over a period of years would be necessary to establish a reliable correlation. Clonal and seasonal differences in time of floral initiation were noted. Quantitative aspects of the flowering capacity of strains or varieties require investigation by improved sampling techniques.

439. DUDLEY, D. I.  
**Cool season grasses can fill profit-killing forage gap.**  
Sth. Seedsman 1951 : 14 : No. 7 : 21, 41, 58-59, 63.

At the Texas Agricultural Experiment Station, results of analyses have shown that certain species and varieties of forage grasses remain succulent and have high vitamin A and protein contents from November to February when summer grasses are generally tough and of low nutrient value. Grasses which show promise for cool season pastures in Texas include three fescues, Kentucky 31, Alta and Alta 144, Lincoln and Achenbach bromes, Texas 46 rescue grass (*Bromus catharticus*), Italian ryegrass (*Lolium multiflorum*) and Western wheatgrass (*Agropyron Smithii*); these are recommended as pure stands or in grass-legume combinations.

440. ESSER, J.  
Hinweise zur Züchtung des Welschen Weidelgrases. (**Indications for the breeding of ryegrass**).  
Neue Mitt. Landw. 1951 : 6 : 527-28.

By sowing in the spring it was shown that the ryegrass seed sold by different German seed firms contained varying proportions of spring and alternative forms in addition to pure winter forms. Experiments are being made to test



whether these differences are associated with differences in winter hardiness.

By continued sowing in spring the constitution of a strain can be radically changed and thereby made more suitable for certain uses, though quite unsuitable for others. Spring sown ryegrass proved superior in yield and quality of green matter and particularly suitable for short days.

441. TIVER, N. S.  
**Some aspects of New Zealand grass-land farming.**  
 J. Dep. Agric. S. Aust. 1951 : 54 : 460-63, 465.

The work of the Grasslands Division of the Department of Scientific and Industrial Research is reviewed (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 898). Improvements include selection for superior strains of *Lolium perenne* and development of a short rotation type by crossing *L. perenne* with *L. multiflorum*.

442. JONKER, J. J.  
 Grondslagen voor de selectie van Engels Raaigras. (**Fundamentals of selection of English ryegrass**).  
 Studiekring voor Plantenveredeling (Plant Breeding Study Circle) 5 November 1948, Wageningen : 230-34. (Mimeographed).

The speaker suggests how this plant should be bred. He describes different types and dates of flowering in pasture and meadow forms. Two methods of breeding exist: that normally used in which plants with two or three different flowering times are selected so that the mixture can adapt itself; or, plants with very different flowering times are selected, e.g. early, semi-early and late, and three types of plant for each of these, viz. with prostrate, intermediate and erect habit. This calls for more work but the selection is done before planting and not by utilization. Selection for protein and carotene contents, and drought and frost resistance are less important and not considered.

443. MANNER, R.  
 Rubinrödsvingel. (**The red fescue Rubin**).  
 Medd. Gullåkers VäxtförädlAnst., Hammenhög 1950 : No. 5-6 : 108-13.

The new selection Rubin [Ruby], bred at the Gullåker Plant Breeding Institute, surpassed the Swedish varieties Viking and Reptans in yield and development of underground runners. It also covers the ground faster than the other

two varieties, grows quickly in spring and does well in a mixture with white clover.

444. OWEN, C. R.  
**Improvement of native dallis grass (*Paspalum dilatatum*) in Louisiana.**  
 Bull. La Agric. Exp. Sta. 1951 : No. 449 : Pp. 40.

An intensive programme of selection has resulted in the development of several new strains having improved seed quality, seed yield and forage production. Strains B 230 and 430 have produced seed of exceptionally high quality.

445. WARNER, J. D.  
**Argentine. New Bahia grass is more vigorous, produces more seed and pasture.**  
 Sth. Seedsman 1951 : 14 : No. 9 : 22, 62, 67.

The Bahia grass Argentine, originating from an introduction by the US Department of Agriculture in 1945, is recommended for planting in Florida, since it shows greater vigour and increased production of seed and pasture in comparison with the varieties Common and Pensacola.

446. **Zoysia progress report.**  
 Sth. Seedsman 1951 : 14 : No. 8 : p. 43.  
 Selected strains of *Z. matrella* and *Z. japonica* are being developed by the US Department of Agriculture at Beltsville, Md., for seeding lawns and playing fields.

447. NYGREN, A.  
**Form and biotype formation in *Calamagrostis purpurea*.**  
 Hereditas, Lund 1951 : 37 : 519-32.

Data are presented concerning numerous controlled crosses made in Sweden between derivatives of a pollen producing clone of the facultative apomict, *C. purpurea*, collected at Gällivare, Sweden, and other European species and strains. Observations showed that a species complex of innumerable forms arises from facultative apomictic strains which reproduce by apomixis and also by hybridization with other facultative strains or species which are purely sexual. Hybridization may occur between plants adapted to different environments, by which means the species complex rapidly colonizes new areas.

The synthesis of *C. purpurea* from crosses between *C. epigeios* and *C. canescens* suggests that several of the amphimictic species of *Calamagrostis* may be heterozygous for the genes

controlling apomixis, having incorporated genes from *C. purpurea* by previous crosses with this species. There is a possibility that genes for apomixis may occur in the entire *Calamagrostis* population within the distribution area of the *C. purpurea* species complex.

448. BRACKNEY, C. T.

**Improved variety wheatgrass now in final testing stage.**

Idaho Agric. Sci. 1951 : 36 : No. 3 : p. 4.

Two promising strains of intermediate wheatgrass (*Agropyron intermedium*), each consisting of about a dozen clones, are undergoing trials at Idaho Agricultural Experiment Station for combining ability and adaptation to different environments. The most suitable clones are to be selected and crossed to form a new improved variety.

449. CHATER, E. H. and JONES, H.

**New forms of *Spartina townsendii* (Groves).**

Nature, Lond. 1951 : 168 : p. 126.

A sparsely flowering dwarf form with brown leaves and a variegated form have been discovered in the Dovey estuary, Wales. The dwarf form has also been found in the Severn estuary. Possibly the two forms represent the disintegration of the formerly stable hybrid polyploid.

## LEGUMINOUS FORAGE PLANTS

450. JULÉN, G.

Du Puits-lucerne—en odlingsvärd sort för svenska förhållanden. (**Du Puits lucerne, a variety worth growing for Swedish conditions**).

Allmänna Svenska Utsädesaktiebolaget (General Swedish Seed Co.) Svalöf 1951 : 40-42.

The author points to the superiority in yield and amount of aftergrowth of Du Puits lucerne and recommends it for southern Sweden and also for central Sweden with certain reservations. His evaluation is based on the results of 15 trials held at six different places covering a range of conditions from Svalöf in the south to Ultuna in the north (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 139).

451. JOURNÉE, F.

La culture de la luzerne. (**The cultivation of lucerne**).

Rev. Agric., Bruxelles 1951 : 4 : 1177-84.

In recommending lucerne growing for Belgian farmers, the varieties Provence, and especially

Du Puits, and also the strain Harmignies which has done so well in the La Famenne district of Belgium, receive special mention.

The lucernes of Poitou, Italy and Hungary, not generally well adapted to Belgian soils, are less hardy and less productive and they suffer from late frosts, a serious defect for upper Belgium.

The varieties grown in Belgium are heterogeneous populations and selection is necessary, a task which the Melle Experimental Station has undertaken, high yield, hardiness and cold resistance being the aims.

452. ISELY, D.

**The Leguminosae of the north-central United States: I. Loteae and Trifolieae.**

Iowa St. Coll. J. Sci. 1951 : 25 : 439-82.

Taxonomic descriptions of introduced or native cultivated species of *Lotus*, *Medicago*, *Melilotus* and *Trifolium* are presented, together with information on chromosome numbers, utilization, strains and other aspects.

453. KARAŠČUK, I. M.

**(The lucerne variety Barnauljskaja 17).**

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 12 : 54-57. [Russian].

A hardy productive variety of lucerne, Barnauljskaja 17 [Barnaul 17], was bred at the Barnaul Breeding Station from Moršanskaja Želtogibridnaja 425 [Moršanskaja Yellow Hybrid 425]. It shows resistance to drought, lodging, pests and diseases and gives two cuts of hay. The breeding method consisted in the selection of biotypes resulting from hybridization between yellow and blue hybrid lucernes and open pollination of the material with Grimm Omskii [Omsk Grimm] and other lucernes. The variety was trained upon good soil during the whole period of its development.

454. SMITH, D. and GRABER, L. F.

**Performance of regional strains of Ranger alfalfa.**

Res. Bull. Univ. Wis. 1950 : No. 171 : Pp. 13.

Regional strains of Ranger, a winter hardy lucerne with a high degree of resistance to bacterial wilt, have been undergoing trials at Wisconsin for a comparison of yielding capacity and adaptability to local conditions. Winter killing losses ranged from 6% for a Montana strain to 25% for one strain from Arizona.



Strains from Montana and Utah gave highest hay yields per acre at the first cutting, but yields from subsequent cuttings of all strains were nearly equal.

455. DAVIS, R. L.

**A study of the inheritance of resistance in alfalfa to common leaf spot.**  
Agron. J. 1951 : 43 : 331-37.

Two leaf spot (*Pseudopeziza medicaginis*) resistant plants of lucerne and four susceptible ones were crossed in all possible combinations, including reciprocals. The  $S_1$  and  $F_1$  generations were graded on the basis of five classes of reactions to the fungus in artificial inoculation tests. Of the two resistant clones, 1699 was more resistant than 1705. Variance data indicated that clone 1699 was nearly homozygous for factors conditioning resistance. Statistical analysis also led to the conclusion that a plant homozygous for resistance would be almost completely prepotent, whereas a homozygous susceptible plant would exhibit no prepotency.  $F_2$  results indicated that a number of genetic factors conditioned reaction to the fungus.  $F_2$  and  $S_2$  data suggested that temperature affected the expression of resistance and susceptibility. The prepotency of clone 1699 was shown in the  $F_2$  as well as in  $F_1$ .

456. VANSSELL, G. H.

**Use of honey bees in alfalfa seed production.**  
Circ. U.S. Dep. Agric., Wash. 1951 : No. 876 : Pp. 11.

Research in California has shown clearly the role of honey bees as pollinating agents of lucerne. Varieties differ in attractiveness to bees with consequent differences in percentage pollination. As it is only when foraging for pollen that bees pollinate lucerne, methods of stimulating their pollen collecting activities rather than their rate of honey production are being investigated.

457. SLEETH, B.

**Witches' broom of alfalfa in the Southwest.**  
Plant Dis. Reporter 1951 : 35 : 77-79.  
(Mimeographed).

Data are presented showing varietal susceptibility to the witches' broom virus of lucerne on the Yuma Mesa, Arizona. It is hoped to initiate breeding for a resistant variety so that the local practice of retaining stands for several years may be continued.

458. GRUN, P.

**Variations in the meiosis of alfalfa.**  
Amer. J. Bot. 1951 : 38 : 475-82.

Numerous cells with one to four quadrivalents, a high degree of pairing irregularity and chromosome lagging suggest that the tetraploid species, *Medicago sativa* ( $2n = 32$ ), is an autopolyploid. Data are presented concerning correlation coefficients between the frequencies of meiotic irregularities. The only significant correlation was that found between laggard frequencies in the first and second telophases.

A high percentage of aborted pollen is an additional feature of meiotic instability, which indicates that the species may be of recent origin.

459. NODA, K.

**(Chromosome studies with clovers).**  
Jap. J. Genet. 1946 : 21 : 93-96. [Japanese].

The following diploid chromosome numbers are reported: *Trifolium pratense*, *T. incarnatum* and *T. agrarium*, 14; *T. hybridum*, *T. alexandrinum* and *T. minus*, 16; *T. repens*, 32, and *T. pannonicum*, ca. 130. Meiosis is regular in all the species. There are 6 nucleoli in *T. pannonicum*, 2 in the other species.

460. MANNER, R.

Hammenhög's Lindby II rödklöver 45/270. (**Hammenhög Lindby II red clover, 45/270**).  
Medd. Gullåkers VäxtförädlAnst., Hammenhög 1950 : No. 5-6 : 127-34.

This new red clover was bred at the Gullåker Plant Breeding Institute from indigenous plants that had survived a severe attack of clover rot in 1936. In trials mainly at Gullåker, it has outyielded all other Swedish late or medium late red clover strains on the market. In addition to disease resistance, the new clover shows resistance to cold and drought. It is recommended for southern and central Sweden, especially where abundant aftergrowth and a good second year crop are needed.

461. CARNAHAN, H. L. and  
FORTMANN, H. L.

**Craig—mammoth red clover.**  
Science for the farmer. 63rd Annual Report of the Pennsylvania Agricultural Experiment Station 1951 : Bull. No. 529 : Suppl. No. 3 : p. 1.

The release of Craig red clover by the Pennsylvania Agricultural Experiment Station is reported. It is intermediate in maturity and is

recommended for ploughing in before planting potatoes.

462. CARNAHAN, H. L. and FORTMANN, H. L.  
**Pennscott—medium red clover.**  
Science for the farmer. 63rd Annual Report of the Pennsylvania Agricultural Experiment Station 1951 : Bull. No. 529 : Suppl. No. 3 : p. 1.

Pennscott, developed from a local strain at the Pennsylvania Agricultural Experiment Station by mass selection, is to be released for increase and certification. It has consistently out-yielded other red clover varieties, particularly during unfavourable conditions under which clover normally dies.

463. RIJCKAERT, E.  
La culture du trèfle rouge (*Trifolium pratense* L.). [The cultivation of red clover (*T. pratense* L.)].  
Rev. Agric., Bruxelles 1951 : 4 : 1185–89.

The various features of economic importance, e.g. persistence, aftermath and the characteristics of root, stem and leaves affecting yield, are described, with notes on the variation that may occur in the chemical composition of the plant.

464. PILATOVIČ, Z.  
**(Ancient land populations of Perm red clover and methods of improving them).**  
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 11 : 51–58. [Russian].

Trials at the Ural Zonal Flax Research Station of 34 populations of red clovers, derived from the land variety Permskii [Perm] and adapted to the severe climatic conditions of the Molotov province, are described. The best method of breeding for hardiness and high yielding capacity proved to be free pollination of the adapted land varieties with varieties derived from Permskii. An improved population, Krasnoe Znamja [Red Flag], was obtained by this method from a local variety open-pollinated with Kazanskii [Kazan], a variety bred from Permskii. It is hardy, shows resistance to drought and yields 75 to 88 c. hay per ha.

Another promising population, 940, still under trial, was obtained by continuous mass selection. Family selection of the land variety 1033 has given unsatisfactory results, since 1164, the most promising form from 1033, yielded less hay than the initial population and the standard Novaja Žiznj [New Life].

465. JULÉN, G.  
Svalöfs Merkur rödklöver i konkurrens med andra stammar i Göta- och Svealand. (Svalöf red clover Merkur, in competition with other strains in Götaland and Svealand).  
Allmänna Svenska Utsädesaktiebolaget (General Swedish Seed Co.) Svalöf 1951 : 36–40.

The stem rot and eelworm resistant variety Merkur, derived from a local Skåne strain Spannarp, is primarily adapted to southern Sweden, with the exception of the highlands. It is also winter hardy enough for nearly all parts of Götaland. Various trials have shown that it has a wider potential range of cultivation than any other southern or central Swedish red clover variety.

466. BINGEFORS, S.  
**The nature of resistance to stem nematode, *Ditylenchus dipsaci* (Kühn) Filipjev, in red clover, *Trifolium pratense* L.**  
Acta Agric. Scand. 1951 : 1 : 180–89.

Susceptibility in the red clover Ultuna depended upon the ability of the nematodes to propagate in the plants; in the resistant variety Merkur the nematodes were not able to breed. Differences between strains with regard to initial penetration were not sufficient to account for differences in susceptibility.

467. HAGEDORN, D. J. and HANSON, E. W.  
**A comparative study of the viruses causing Wisconsin pea stunt and red clover vein mosaic.**  
Phytopathology 1951 : 41 : 813–19.

At Wisconsin Agricultural Experiment Station, an investigation concerning the viruses responsible for pea stunt and red clover vein mosaic has revealed a similarity of symptoms and an identical host range, from which it is assumed that the same virus causes both diseases.

468. LUNDBLAD, K. and LAGERQUIST, R.  
Stamförsök med rödklöver. (Field trials with red clover).  
Medd. Stat. Jordbruksförsök, Norrtälje 1951 : No. 31 : Pp. 67 and Försök och Forskning 1951 : 8 : 57–59.

A detailed review is given of the results of extensive trials of red clover varieties, initiated in 1940 in Sweden. Over 200 strains, including some synonyms, are mentioned. Local adaptation of strains and varieties in different regions



of the country is discussed and a separate chapter by H. Ekstrand is included on resistance to *Sclerotinia Trifoliorum* and the way in which this characteristic may be affected by environment and by biotypes of the fungus. Bingefors' work on breeding for resistance to clover eelworm is cited (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1919), and mention is made of trials of tetraploid red clover, which, if successful, may put the strain question in a new light.

469. VAN SLIJCKEN, A.  
Le trèfle rouge. Choix de variétés.  
(**Red clover. Choice of varieties**).  
Rev. Agric., Bruxelles 1951 : 4 : 415-25.

For the past five years, the National Research Station for Plant Breeding at Melle, Belgium, has carried out red clover trials, to compare the known indigenous strains and to discover new indigenous races and interesting material for breeding purposes. Results are also given of comparative trials of foreign varieties, which included Swedish tetraploid red clovers. The local strain Waasse, also known as Lokeren or the Pays de Waes clover, outyielded both the tetraploid and diploid Swedish clovers. The tetraploid Swedish strain was slightly superior in yield to the Swedish diploid.

Since it seems that preference in Belgium should be given to indigenous strains, research has already been begun to assess the value of native tetraploids.

470. DAVIS, J. N.  
**Louisiana improved Mother White.**  
Sth. Seedsman 1951 : 14 : No. 9 : 24, 50.

Louisiana Improved Mother white clover has been bred by Hamburg Mills, Hamburg, La., from white clover grown in Louisiana and introduced evergreen strains. It grows as large as Ladino clover and has the additional advantages of greater seed production and resistance to heat and drought and of providing good grazing over a longer season.

471. DESSUREAUX, L.  
**Ovule formation as a factor influencing seed-setting of Ladino white clover.**  
Sci. Agric. 1951 : 31 : 373-82.

Experiments were carried out to determine: (1) the range of the number of ovules per floret; (2) variation within and between clonal lines in relation to number of ovules per floret, number of seeds per floret and percentage of seed-bearing florets; (3) variation in ovule and seed number and percentage of seed bearing florets

within the flower head; and (4) variation in number of ovules and seeds among progenies. Differences between clonal lines were highly significant for all three characters. The progenies studied, comprising four open-pollinated strains developed by maternal line selection for high and low seed setting and three crosses made among plants selected for high seed setting, also differed significantly in number of ovules and seeds per floret. Interplant variance within the open-pollinated strains did not differ greatly from that of a commercial lot of Ladino clover, indicating that maternal line selection did not, in the early generations, reduce the genetic variability in ovule and seed number. Selection was, however, effective in changing the number of ovules and seeds in the direction of high and low values. A high number of ovules and a high degree of pollination appear to be the main factors favouring good seed setting. Selection based on seed setting often resulted in an increase in ovule number and generally in improved efficiency of pollination. Breeding for a greater number of ovules, a higher percentage of seed bearing florets and a higher proportion of ovules developing into seeds is recommended to improve seed setting in Ladino.

472. KREITLOW, K. W. and  
SPRAGUE, V. G.  
**Effect of temperature on growth and pathogenicity of *Sclerotinia trifoliorum*.**

Phytopathology 1951 : 41 : 752-57.

The results included the observation that monoascospore isolates from both the same and different apothecia possessed highly significant differences in pathogenicity in tests with Ladino clover plants at various temperatures.

473. HARBERTS, C. L.,  
IMMINK, H. J. and  
VERBRUGGE, C. W.  
Onderzoek naar het blauwzuurgehalte van diverse witte-klaverrassen (*Trifolium repens* L.), in verband met ziekteverschijnselen, waargenomen bij enige paarden. [Investigation on the hydrocyanic acid content of various white clover strains (*T. repens* L.) in connexion with disease symptoms observed in some horses].  
Versl. Cent. Inst. Landbouwkundig Onderz. 's-Gravenhage 1950 : 148-53.

Tables are given showing the HCN content of Friesian white clover, Wilkla pasture clover and other strains of white clover.

474. ISBELL, C. I.

**These varieties give you more cow-pea profits.**

Sth. Seedsman 1951 : 14 : No. 8 : 26, 39, 42.

Descriptions are given of five new varieties for table use developed by the Alabama Agricultural Experiment Station. Alabunch and Alacrowder are both early varieties, with a bunching growth habit, bearing good quality peas; the latter variety has very tough pods whereas the green pods of Alabunch shell readily. Alabrown is adapted to machine harvesting and weathers well in the field; the pods are easily shelled when green. Alalong is a mid-season variety which continues fruiting for a long period, producing large green pods containing good quality peas which cook well. The remaining variety, Early Dixie Queen, matures very early and has a lower growth habit than Dixie Queen from which it was selected; the pods are shelled easily and contain peas of high quality.

475. S., H. B.

**A promising variety of cowpea from the Philippines.**

Indian Fmg. 1950 : 11 : p. 443.

Adaptability trials relating to yielding capacity and other characteristics are in progress with EC 455, introduced by the Indian Council of Agricultural Research; in the Philippines, where it is used extensively as a fresh vegetable, EC 455 bears pods very early in the season and continues to give high yields for 2½ months.

476. HERTZSCH, W.

Beobachtungen an polyploider *Vicia villosa*. (**Observations on polyploid *V. villosa***).

Z. Pflanzenz. 1951 : 30 : 210-17.

The plants obtained on treating *V. villosa* with colchicine showed various stages of polyploidy from 4n to 10n. Measurements of the stomata and pollen grains in the polyploid plants differed in no way from the normal. Nearly all the polyploids returned to the diploid state after a few generations, but in the case of the hexaploids this process took place in stages. It is probable that this reverse change occurs both in the somatic and sex cells. Some of the progeny in which the chromosome number had reverted to the original diploid number, were phenotypically similar to the polyploid parents, a fact which may be important for polyploid breeding.

477. TATUNO, S.

**(Cytological studies on the root nodules of leguminous plants).**

Jap. J. Genet. 1946 : 21 : 112-14. [Japanese].

Polyploid cells have been observed in the bacterial root nodules of the following plants: *Vicia hirsuta*, 3x-8x; *V. sativa*, 3x-6x; *V. tetrasperma*, 3x-6x; *Pisum sativum*, 3x-8x; *Trifolium repens*, 3x-4x; and *Astragalus sinicus*, 3x-4x.

478. SCHIEBLICH, J.

Beitrag zur Züchtung von Esparsette (*Onobrychis viciaefolia* Scop.). [**Contribution to the breeding of sainfoin (*O. viciaefolia* Scop.)**].

Züchter 1951 : 21 : 132-36.

The main aim of the first part of the author's breeding research was improved seed production. Firm articulation of the fruit and the neighbouring parts of the plant involved in seed production is a prime prerequisite. Forms with various defects in this respect are discussed. The ideal form to breed for should have a firm junction between the fruit and the calyx, the calyx and its peduncle and the peduncle and the rachis; of 42200 plants only four showed this ideal form. Breeding for decrease in the 1000 seed weight, using the variety Bendelebener D4, is suggested. The seed yield must of course be maintained or increased. A low 1000 seed weight, i.e. small size of seed, seems to be correlated with narrow leaflet and therefore breeding for small seeds must not be at the expense of leafiness. The connexion between seed yield and size and form of the fruiting spike and the seed set has yet to be investigated. Fleischmann's view that a subspecies *persica* exists, is refuted, the author regarding it as a geographical race.

It was found that attack by *Erysiphe Martii* was earliest and most severe in types of sainfoin plants with infolded leaflets, owing to retention of water droplets. The form of the leaflets is, therefore, important in breeding for resistance to fungous diseases. All plants in which the leaflets are not infolded may not, however, be resistant; other factors are involved and it may be that resistance due to other factors will be found in plants with infolded leaflets; it has been noted that attack by mildew is delayed and slower in plants with smooth leaflets. Resistance to *Uromyces Onobrychidis* was observed in plants adjacent to others severely attacked,



whence it is deduced that factors for resistance to rust exist.

In the author's view it will be a long time before breeding will limit the wide spread damage due to *Contarinia Medicaginis*.

479. THOMSON, J. R.

**Sainfoin in its first harvest year.**

J. Brit. Grassland Soc. 1951 : 6 : 107-17.

A comparison between Eastern Counties Giant and Hampshire Common grown in Berkshire, England, showed that, although Giant grew rapidly in the seeding year and outyielded Common, in each month from March to September of the following year the yield of Common was significantly greater than that of Giant. Common withstood repeated cutting better than Giant and proved superior in respect of total yield over the two years.

480. ERDMAN, L. W.

**The effectivity of different strains of *Rhizobium* on annual and perennial lespedezas.**

Proc. Soil Sci. Soc. Amer. 1950 (1951) : 15 : 173-76.

A study was made of the variation in the effectiveness of 26 *Rhizobium* strains on *Lespedeza striata*, *L. stipulacea* and *L. cuneata*.

481.

**New lespedeza resists nematodes and mildew.**

Crops and Soils 1951 : 3 : No. 9 : p. 28.

A new variety of Korean lespedeza, named Rowan, has been released by the North Carolina Agricultural Experiment Station in cooperation with the US Department of Agriculture. Rowan resembles commercial Korean in date of maturity and seed characteristics but has a higher degree of resistance to root knot nematodes and powdery mildew.

482. HACKBARTH, J.

**Beobachtungen über den Entwicklungsrhythmus bei *Lupinus luteus*. (Observations on the developmental rhythm of *L. luteus*).**

Z. Pflanzenz. 1951 : 30 : 198-209.

The developmental rhythm of *L. luteus* is affected by external conditions, e.g., day length, temperature and water supply. Hereditary differences in the developmental rhythm were also observed. The yellow sweet lupin strain 7844, a mutation from the normal type, showed a more rapid early development, which is conditioned by a single recessive gene *cel* and is accompanied by the higher insertion of the branches on the stem, with fewer side branches

and fewer pods; the pods, however, are so well developed that the number of seeds is no less than in normal strains. Another mutant, strain 1686, shows even more rapid early growth than strain 7844; the ripening time too is even earlier than that of strain 7844 which also ripens earlier than the normal type of plant. The final height attained by plants of strain 1686 was greater than that of any other variety tested so far. The gene *alt* for this tall growth appears to be also a simple recessive. Work so far seems to show that the character of earlier ripening in strain 1686 is hypostatic to the characters conditioned by *cel* and *alt*.

483. LAMBERTS, H.

**Veredeling van voederlupine voor voedingsdoeleinden. (Breeding the fodder lupin for human consumption).**

Voeding 1950 : 11 : 217-26.

The history of the fodder lupin, its chemical composition and its potential value as a source of protein in man's diet are discussed. The efforts of breeders to evolve an alkaloid-free sweet lupin are mentioned, special reference being made to Dutch work and to the difficulty of evolving a test sensitive enough to distinguish chemically between the different strains of fodder lupins.

484. WEIMER, J. L.

**Anthracoze resistance in lupines.**

Plant Dis. Reporter 1951 : 35 : 80-81. (Mimeographed).

Numerous local and imported strains of *Lupinus angustifolius*, *L. luteus* and *L. albus* were tested at the Georgia Agricultural Experiment Station for reaction to *Glomerella cingulata*. All forms grown commercially in the USA were susceptible, but five varieties of *L. angustifolius* and one of *L. luteus* imported from Portugal showed a high degree of resistance. As the Portuguese varieties lack the vigour and seed quality of local strains they will only be used for breeding purposes.

485. LAMBERTS, H.

**Resistentie tegen aantasting door *Fusarium oxysporum* in gele lupine. (Resistance to infection by *F. oxysporum* in yellow lupins).**

Landbouwk. Tijdschr. Wageningen 1951 : 63 : 458-59.

In Dutch experiments some genetically resistant strains of yellow lupin have been found in material from land races among wild lupins from Portugal. The actual mode of inheritance is not yet known.

486. ARMSTRONG, J. K. and ARMSTRONG, G. M.  
**Physiological races of the *Crotalaria* wilt *Fusarium*.**

Phytopathology 1951 : 41 : 714-21.

On the basis of pathogenicity to species of *Crotalaria*, three physiological races of *F. udum* var. *Crotalariae* were identified: race 1 from India, race 2 from the Louisiana-Mississippi area and race 3 from Florida. *Crotalaria* species inoculated with *Fusarium* wilt isolates from other hosts showed no external symptoms of wilt.

487. CHAPIN, W. E., HAFENRICHTER, A. L. and LAW, A. G.  
**Performance of strains of *Lotus corniculatus* on the North Pacific coast.**

Agron. J. 1951 : 43 : 438-42.

Two narrow-leaved strains of *L. corniculatus* and two strains of *L. uliginosus* failed to become established on upland soils at two locations in western Washington, but five broad-leaved strains of *L. corniculatus* showed greater adaptability. Three of these five strains, Cascade (P-13659), Italian (FC 23139) and Commercial (P-7123), gave high average yields at Bellingham and produced satisfactory stands at Vancouver; Cascade has strong seedling vigour and becomes established rapidly so that it grows well when mixed with an aggressive grass such as *Dactylis glomerata*.

488. ZANINI, E. and BALLATORE, G. P.  
Risultati di colture d'orientamento con "sulla" (*Hedysarum coronarium* L.) di diversa provenienza, eseguite nelle annate 1948-49 e 1949-50 in territorio di Caltanissetta. [Results of preliminary tests with *H. coronarium* L. of varying provenance, carried out in 1948-49 and 1949-50 in the Caltanissetta area].

Ann. Fac. Sci. Agr. Univ. Palermo 1950 : 1 : 73-95.

Observations on six forms of *H. coronarium* of different provenance showed them to represent distinct morphological and ecological types, the characteristics of which are described and illustrated. Selection is being carried out in order to create improved strains for forage purposes in Sicily, using the material here described and certain wild Sicilian forms as a starting point.

## ROOTS AND TUBERS

489. PANOVA, V. V.  
**(Vegetative hybridization of forage root crops and forage cabbage).**  
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1951 : No. 11 : 41-45. [Russian].

Methods recently developed at the Kalinin Provincial Research Station for vegetative hybridization of various forage plants are described. The aim of the experiments is to obtain better quality roots of the Vyšgorodskaja swede and Östersundom turnip, and leafier plants of the Zelenaja Mozgovaja [Green Marrow] forage cabbage.

The vegetative hybrids obtained by the new techniques include Zelenaja Mozgovaja cabbage on Sinjaja Mozgovaja [Blue Marrow] cabbage, Vyšgorodskaja swede on Sinjaja Mozgovaja cabbage, an unnamed variety of kohl rabi on Sinjaja Mozgovaja cabbage and Egipetskaja [Egyptian] beet on sugar beet.

490. SCHEYGROND, W.  
De opvattingen in Zweden en Dene-marken over de achteruitgang van bieten bij nateelt. (Opinion in Sweden and Denmark on the degeneration of beets in the course of multiplication). Studiekring voor Plantenveredeling (Plant Breeding Study Circle) 19 January 1950, Wageningen 316-22. (Mimeographed).

The speaker restricted himself to the question of how far selected cross-pollinated varieties deteriorate in the absence of continued selection. Three cases are distinguishable: (i) where seed production is the main goal, e.g. rye and maize, no deterioration is to be expected, e.g. the sixth generation of Petkus rye was indistinguishable from the original seed; (ii) where seed production is more or less negatively correlated with desired characters, e.g. in grasses and clovers, there is the greatest chance of degeneration, although selection can be so arranged that the danger is not great; and (iii) where no clear relationship exists between the desired character, in this case yield, and seed production, e.g. there is often a negative correlation between yield of seed and sugar. Deterioration may also occur through the segregation of undesirable recessive characters.

Under the Danish system of seed growing deterioration would be very important and the Danes generally consider that it does not occur.



In Sweden, however, deterioration is considered to occur. Rasmussen's opinion is that it does not occur where it is possible to multiply a variety without selecting at the same time. The environment, however, exerts a strong effect. By selecting a cross-pollinated variety it is possible that it is merely kept up to standard or possibly further improved. Rasmussen found no improvement in Danish and Swedish varieties during the period 1908-1927, possibly because the varieties were too homogeneous in yield factors, and because of the negative correlation between the yields of dry matter and seed.

491.

**Fodder beet. A preliminary note.**  
Leaf. Nat. Inst. Agric. Bot. 1951 : Pp. 3.

Information is given on the dry matter percentage in the root and on ease of lifting of three groups of strains under Danish conditions: (1) Barres type of mangold, (2) fodder sugar beet and (3) sugar beets for fodder. Many of the Danish strains have been tested in England; in general their behaviour is similar in the two countries. Strains available in experimental quantities from British seed merchants are listed.

492.

DAVEY, V. M'MASTER  
**Fodder beet. I. Fodder beet in Denmark and Sweden.**  
Scot. Agric. 1951 : 31 : 91-93.  
MEIKLEJOHN, A. K. M.  
**Fodder beet. II. Fodder beet in south-east Scotland.**  
Ibid. 1951 : 31 : 93-96.

Fodder beet breeding and the performance of fodder beet types and strains in Denmark and Sweden are outlined.

The results of trials of Scandinavian fodder beet strains at several centres in south-east Scotland and of pig feeding trials with fodder beet are encouraging, although good yields can only be expected under good soil and climatic conditions.

493.

FIDDIAN, W. E. H.  
**Fodder beet: a general review.**  
J. Minist. Agric. 1951 : 58 : 258-63.

Based on the results of trials in Norfolk, England, and information received from Denmark and Holland, the relative advantages of different types of fodder beet are discussed with reference to percentage dry matter, particularly carbohydrate and protein, feeding value for

different livestock and keeping quality (cf. Abst. 491).

494.

HURWITZ [HURVITS], S. and LAHOVER, D.  
**(The effect of growth conditions on the chemical composition of beets).**  
Hassadeh 1951 : 31 : 371-74 [Hebrew].

Analyses of mangels, grown in various parts of Israel, showed that the total dry matter content of Mammoth and Slodstrop exceeded that of all other varieties. The protein content of Anak Edom [Red Giant] exceeded that of other varieties by about 2%.

Sugar beets showed great variation in chemical composition. Hilleshög had the highest dry matter content.

495.

JÄHNEL, G.  
Ergebnisse der Rübenversuche des Jahres 1950. **(Results of the beet trials of the year 1950).**  
VersErgebn. Bundesanst. alp. Landw. Admont 1951 : No. 11 : Pp. 37.

Trials were carried out with varieties of sugar beet, fodder beet and sugar mangel. Since the primary aim was to test the effect of high altitudes on the varieties the trials were made in as many high lying places as possible.

The results showing the relative yields of roots and sugar for the sugar beet varieties, of roots and dry matter for the fodder beet varieties and of roots and dry matter for the sugar mangel varieties are given in tables for each locality. In the case of the sugar beets, graphs showing the yields of beets and sugar in relation to altitude and rainfall are shown.

496.

NISHIYAMA, I.  
**(On intergeneric hybridization between tetraploid strains of radish and Brassica).**  
Jap. J. Genet. 1946 : 21 : p. 115. [Japanese].

The value of the method of intercrossing colchicine-induced tetraploids for the production of amphidiploids is discussed with reference to the author's own experiments on reciprocal crosses of tetraploid strains of radish, on the one hand, and cabbage and turnip, on the other.

497.

La rutabaga costituisce un ottimo foraggio. **(The swede forms an excellent forage).**  
Agricoltura Tosc. 1951 : 6 : p. 336.

In this note, urging Italian farmers to grow swedes, it is announced that some Danish

varieties acclimatized to Piedmont have undergone selection by G. Jacometti.

498. STERLING, J. D. E.

**The inheritance of flesh colour and clubroot reaction in swedes.**

Sci. Agric. 1951 : 31 : 253-68.

The material investigated comprised selfed progenies,  $F_1$  and  $F_2$  hybrids and back crosses derived from two highly club root resistant  $S_4$  plants of Danish Giant, designated A and C, and two open-pollinated plants of the highly susceptible variety Ditmars Bronze Top, designated E and F. The data suggest that at least four major factor pairs differentiate reaction to the club root fungus. Two pairs differentiate A and E, and C and E, susceptibility being partially dominant. Two pairs differentiate A and F, resistance being partially dominant. It was not possible to determine the factorial differentiation between C and F. Possibly F was heterozygous for minor factors and also for some or all of the major factor pairs involved. The following genotypes are proposed: A and C, *aabbCCDD*; E, *AABBCCDD*; and F, *a-b-c-d*, the other member of each gene pair being as yet uncertain. Flesh colour was conditioned by duplicate factors. Yellow flesh colour was determined by two gene pairs in the homozygous recessive condition. No association was detected between flesh colour and reaction to club root.

499.

**Varieties of potatoes.**

Fmrs' Leaf. Nat. Inst. Agric. Bot. 1951 : No. 3 : Pp. 7.

Descriptive notes on early and maincrop varieties recommended on the basis of trials in England and Wales are included.

500. CAMPBELL, J. C. and

MACFARLAND, C. S. (Jun.).

**American Potato Yearbook 1951 : Pp. 80.**

The yearbook includes information on the following: production of certified seed in the USA and Canada; recent references dealing with breeding, varieties, disease and insect control and other aspects of potato production; statistics of commercial cultivation in the USA and other countries; present status of varieties in the 48 States, Alaska and Hawaii; research projects at the federal and state experiment stations; and periodicals of interest to those engaged in the potato industry.

501. LIVERMORE, J. R.

**The Canoga potato.**

Amer. Potato J. 1951 : 28 : 672-74.

Further information on the medium late variety Canoga is given (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2775). The variety was derived from (Albion x Katahdin) x Katahdin. At Ithaca, NY, Canoga has given high yields. During the six years prior to its release the variety showed only a trace of leaf roll, but in 1950 a fairly high percentage of plants were infected. No symptoms of net necrosis or any other internal discoloration have been recorded. Canoga is resistant to leafhopper and varnished plant bug, and matures about 10 days later than Katahdin. The cooked tubers are described as having an exceptionally fine flavour; the variety is suitable for making crisps.

502. CARTMILL, W. J. and

BECHTEL, W. H.

**Potato culture in Queensland.**

Qd. Agric. J. 1951 : 72 : 311-33.

Brief descriptions of the varieties suitable for Queensland and photographs of their tubers are included.

503. WIERSEMA, H. T.

Groeistoffen en plantenveredeling naar aanleiding van een onderzoek bij aard-appels. (**Growth substances and plant breeding with reference to an experiment with potatoes**). Studiekring voor Plantenveredeling (Plant Breeding Study Circle) 23 November 1950 Wageningen : 338-41. (Mimographed).

The variety Bintje produces no pollen and few of the estimated 200-300 egg cells present in the ovary are fertile; and, in addition, because too few egg cells are fertilized after pollination, insufficient growth substance is produced and the flowers fall off or only tiny berries develop which usually abort.

Plants of Bintje with flowers already pollinated were grafted on to tomatoes and then sprayed with 0.1% and 0.2% solutions of Regulex 2-4D. The following day the flower and inflorescence stalks drooped. Berries were set in nearly every flower, and even in buds, but these contained no seed. Spraying on the same day as pollination resulted in about 3 seeds per berry, the number increasing with the time elapsing after pollination, though the number of berries



decreases. Spraying is recommended 2-3 days after crossing. About 1000 litres per ha. of 0.2% solution is probably sufficient for field operations. The quantity of growth substance per plant is important. Spraying before pollinating results in practically no seed. Although the number of seeds per berry is less, the total number of seeds harvested after early spraying is greater than after later spraying, because of the much greater number of berries that are set after the earlier treatment; these would fall off before the later spraying.

Temperature is particularly important for fertility; apparently plenty of sunlight is desirable during reduction division. Differences between day and night temperatures are important.

In potatoes, abundant pollen implies good pollen. If there are few pollen grains, the anthers may not open.

504. STEWART, G. F.,  
VOLK, N. J. and  
SALTER, R. M.  
**New varieties released—Cherokee.**  
Amer. Potato J. 1951 : 28 : 642-43.

Additional information is given in respect of the origin of Cherokee (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2775) from the cross X 96-56 x X 528-170. The female parent is early maturing and resistant to late blight, while X 528-170 is a late maturing scab resistant selection.

505. RUDORF, W. and  
SCHAPER, P.  
Grundlagen und Ergebnisse der Züchtung krautfäuleresistenter Kartoffelsorten. (**Principles and results of breeding *Phytophthora* resistant potato varieties**).  
Z. Pflanzenz. 1951 : 38 : 29-88.

The crossability of (a) fully *Phytophthora* resistant forms of *Solanum demissum*, *S. Antipoviczii*, *S. Salamanii* *S. polyadenium* and *S. ajuscoense* and of (b) *S. tuberosum* subsp. *andigenum* with *S. tuberosum* is discussed. Similarly the results of crossing various forms of *S. demissum* with the fully resistant *S. verrucosum* and of crossing this hybrid with *S. tuberosum* are set out. Finally the production of further complex hybrids from (*S. Antipoviczii* x *S. Rybinii*) x *S. tuberosum* x (*S. andigenum* x

*S. tuberosum*) in combination with various *S. demissum* x *S. tuberosum* hybrids is described.

It was possible to obtain from all the wild species used, by crossing and back-crossing with *S. tuberosum*, (1) simple hybrids, involving only one wild species, and (2) complex hybrids, involving two or more wild species, which were highly resistant to the *Phytophthora* races of the groups A, B and C and which at the same time showed satisfactory yields and quality; many of these hybrids, however, were attacked by a new and more virulent biotype of *Phytophthora* which appeared at Scharnhorst, Germany, in 1950, and of the 22 older hybrid clones highly resistant up to 1949 only two remained fully resistant in 1950. Of 78 of the newer hybrid clones, which were mainly clones involving *S. demissum* and complex hybrids of various wild species, 20 proved fully resistant even to the new biotype.

From the results of their work as a whole the authors conclude that the resistance genes of several wild species have been concentrated in hybrid clones and at the same time undesirable genes of the wild species have been suppressed to such an extent that crossing of the progenies results in a high proportion of resistant seedlings showing satisfactory yields and the characters for good quality.

The biology and formation of races of *Ph. infestans* are also discussed. The results of testing a great number of wild species for resistance to various *Phytophthora* races and mixtures of these races are summarized.

506. ZVEREVA, P. A.  
(**Vegetative hybridization of the potato**).  
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 11 : 73-80. [Russian].

Soviet literature on the vegetative hybridization of potatoes is surveyed.

507. ABDUL HAFIZ  
**Some studies on shortening the rest period in potato tubers.**  
Pakistan J. Sci. 1949 : 1 : 94-99.

Experiments carried out at Lyallpur have shown that dormancy of freshly harvested potatoes can be curtailed by removing the epidermis. It is hoped that potato breeding

will be facilitated by thus shortening the duration of each generation.

508. SÍVORI, E. M.  
La degeneración de la papa. (**Degeneration of the potato**).  
Ciencia e Investigación, B. Aires 1951 : 7 : 291-302.

Experiments set up by Tisio using virus-free stocks of Katahdin showed that tubers sprouted at 28-32°C produced yields inferior to those from tubers sprouted at 4-9°C. It is suggested, therefore, that degeneration in Argentina may be an environmental phenomenon and avoidable by planting a small stock of tubers in autumn to produce seed potatoes that have developed under cold conditions for the following spring planting.

509. TORKA, M.  
Zur Selbststerilität von *Solanum chacoense* Bitt. (**On the self sterility of *S. chacoense* Bitt.**).  
Z. Pflanzenz. 1951 : 30 : 309-14.

*S. chacoense* comprises a heterogeneous mixture of plants which often differ in habit and physiological behaviour; occasionally self fertile seedlings are found which have many berries and seeds, but generally *S. chacoense* plants are practically self sterile.

A large number of selfings were made under varied experimental conditions to find out whether the number of berries obtainable on selfing could be increased.

When *S. chacoense* was grafted on tomato the average percentage of berries was about twice as high as in ungrafted plants, the figures being 3.5 and 5.9 for grafted plants as compared with 1.3 and 3.1 for the ungrafted.

On treatment with colchicine it was found that many, though not all, self sterile plants became fertile in the tetraploid form.

Dual pollination, first with *S. tuberosum* pollen followed by *S. chacoense* pollen, resulted in a high percentage of berries, i.e. 6.3%, but the number of seeds per berry was low. Amongst 800 seedlings from seeds so obtained there were only 12 F<sub>1</sub> hybrids, the remainder being pure *S. chacoense* plants. Since *S. tuberosum* pollen produced seeds capable of germination only in a few cases, seed production due to *S. chacoense* pollen must have increased. The possibility that the presence of *S. tuberosum* pollen had made the conditions for germination of the *S. chacoense* pollen more favourable has yet to be investigated.

510. ROSS, H. and  
BAERECHE, M.-L.  
Über die Bedeutung der argentinischen *Solanum*-Arten '*simplicifolium*, *vernei*, *berthaultii*, *acaule* und einiger Formen von *S. andigenum* für die Züchtung krankheitsresistenter Kartoffeln. (**On the significance of the Argentine *Solanum* species *simplicifolium*, *vernei*, *berthaultii*, *acaule* and some forms of *S. andigenum* for the breeding of disease resistant potatoes**).  
Z. Pflanzenz. 1951 : 30 : 280-91.

Some seedlings of *S. simplicifolium* and a higher percentage of seedlings of *S. Vernei* could not be infected with viruses Y<sup>N</sup> or Y<sup>C</sup> artificially with sap or in the field by contact with the virus or from aphids. None of the seedlings of the cross *S. acaule* "Bukasov" x *S. acaule* "von Rosenstiel" could be infected by rubbing with viruses X<sup>B</sup> or X<sup>P</sup>. It is probable that a high degree of hypersensitivity is present.

Of all the species and varieties so far studied, *S. Berthaultii* showed the highest degree of intolerance of leaf roll virus.

In the case of *S. Vernei*, *S. Berthaultii* and *S. andigenum* "Mesada," attack by *Phytophthora* is very slow and weak.

511. HAWKES, J. G.  
Algunas observaciones sobre la papa del Ecuador. (**Some observations on the potatoes of Ecuador**).  
Flora, Quito 1950 : 7 : Nos. 17-20 : 93-96.

Mention is made of a wild Colombian species, *Solanum Andeanum*, which is immune to *Phytophthora infestans*, of various wild potato species found in Ecuador and the potato diseases occurring there.

512. OCHOA, C.  
Algunos estudios sobre papas peruanas como base para un programa de mejoramiento en el país. (**Some studies on Peruvian potatoes as a basis for a programme of potato improvement in that country**).  
Agronomía, Lima 1951 : 16 : No. 65 : 31-38.

Descriptions are given of a number of indigenous Peruvian wild and cultivated potato species which are of interest for breeding purposes. They include the diploid species *Solanum goniocalyx*, the "highest quality potato in the



world," resistant to moderate frosts; and *S. stenotomum* which has clones possessed of high quality, earliness, yield and fertility; the triploid species *S. Juzepczukii*, resistant to frost but difficult to cross; *S. Chaucha*, characterized by extreme earliness; and *S. coeruleiflorum*, good in quality; the tetraploid species *S. tuberosum* subsp. *andigenum*, containing forms resistant to wart, frost and certain viruses; and the pentaploid species *S. curtilobum*, highly resistant to frost; and among the wild species the frost resistant species *S. acaule*, *S. Bukasovii*, *S. Abbottianum* and *S. multidissectum*, the drought resistant species *S. medians* and *S. neoweberbaueri* and the species *S. ochranthum*, which is resistant to borer attack, though sterile in crosses with other species.

513. WERNER, H. O. and SANDSTED, R. F.  
**Performance of scab resistant potato varieties in western Nebraska.**

Amer. Potato J. 1951 : 28 : 645-58.

The following varieties were tested in 1948 and 1949: Ontario, Menominee, Russet Sebago, Yampa and Progress. The last named variety appeared to be the most desirable for western Nebraska, because of its attractive red-skinned tubers, relatively low infection with mild types of scab, freedom from harvest cracks, and good table quality. In fields where scab was severe, Progress sometimes showed less scab than Russet Sebago.

514. NATTRASS, R. M. and RYAN, M.  
**New hosts of *Phytophthora infestans* in Kenya.**

Nature, Lond. 1951 : 168 : 85-86.

Late blight first appeared in Kenya in 1941. A new biotype, E, reached Kenya from Tanganyika in 1948, resulting in the breakdown of the resistance of seedlings received from the Scottish Society for Research in Plant Breeding. New hybrids immune from biotypes A, B, C, E and F are now under trial. During 1950, it was discovered that the perennial species *Solanum indicum*, *S. incanum* and *S. panduraeforme* were attacked by late blight.

515. INGÓLFUR DAVÍÐSSON  
Rannsóknir á gróðursjúkdómum. (**Investigations on plant diseases**).  
Rit Landbúnaðardeildar 1951 : A-flokkur No. 3 : Pp. 21.

Local Icelandic potato varieties are very susceptible to *Phytophthora infestans*. The most

resistant varieties proved to be Alpha and Ackersegen. All the introduced and local varieties tested were susceptible to *Bacillus phytophthorus* except the local variety Rauðbleikar islenzkar [Red Icelandic].

516. \*BAKKER, B. M.  
Problemen bij het op *Phytophthora*-resistentie kweken van aardappelen. (**Problems in breeding potatoes resistant to *Phytophthora***).  
Studiekring voor Plantenveredeling (Plant Breeding Study Circle) 15 July 1947 Wageningen 154-67. (Mimeographed).

This contribution to the study of *Phytophthora* resistance dealt largely with the biology of the fungus, the mode of infection, the nature of resistance and physiological races, as well as with the basic principles of breeding for resistance. Touching on future methods of work, the speaker referred to the necessity of ascertaining the degree to which *Ph. infestans* is genetically variable.

517. SCHAPER, P.  
Die Bedeutung der Inkubationszeit für die Züchtung krautfäule-resistenter Kartoffelsorten. (**The significance of the incubation time for the breeding of blight resistant varieties of potato**).  
Z. Pflanzenz. 1951 : 30 : 292-99.

In breeding for blight resistant potato varieties, the author suggests that the physiological specialization of *Phytophthora infestans* may be counteracted by selection of potato forms in which the incubation of the fungus is retarded and the number of sporangia formed is low. These two characteristics are, as far as is known, independent of the race of fungus present. After infection the normal period for attaining profuse fructification in susceptible types of potato is 3-6 days and in forms exhibiting delayed incubation this period is 1-2 days longer.

Amongst German varieties which showed retarded incubation times are Allerfrüheste Gelbe [Earliest Yellow], Voran [Forward] and Ackersegen. In 33 different collections of *Solanum tuberosum* subsp. *andigenum*, about 50% of the plants tested exhibited delayed infection. Some wild *Solanum* species also show similar effects; selection for delayed incubation and the production of only a small number of sporangia is recommended with the ultimate aim of using such forms in resistance breeding.

\* An extended summary of this paper is on file at the Bureau.

A reliable and quick method for testing single leaves is described.

518. LIHNELL, D.

Prövning av potatisblastens resistens mot bladmöglet. (**Testing the resistance of potato haulms to leaf blight**). Växtskyddsnotiser 1951 : No. 2-3 : 29-33.

KAMMERMANN, N.

Undersökningar rörande potatisbladmöglet, *Phytophthora infestans* (Mont.) de By. I. Metodologisk undersökning angående prövningen av potatisblastens resistens mot bladmöglet. [**Investigations concerning leaf blight, *Ph. infestans* (Mont.) de By. I. A methodological investigation with reference to the testing of resistance of the potato haulm to blight**].

Medd. Växtskyddanst. Stockh. 1950 : No. 57 : Pp. 41.

KAMMERMANN, N.

Undersökningar rörande potatisbladmöglet, *Phytophthora infestans* (Mont.) de By. II. Sambandet mellan potatisbladsaftens peroxidaktivitet och *Phytophthora*resistensen. [**Investigations concerning leaf blight, *Ph. infestans* (Mont.) de By. II. The relation between the peroxidase activity of the sap of the potato haulm and resistance to *Phytophthora***].

Medd. Växtskyddanst. Stockh. 1951 : No. 58 : Pp. 32.

A method of determining blight resistance of the potato leaf, devised by N. Kammermann of the Swedish Phytopathological Institute, is described. Potato seedlings in the greenhouse are infected with blight by putting drops of water containing spores of the fungus on the leaves and leaving the plants in a humid atmosphere until the characteristic aerial mycelium begins to develop at the sites of infection. The more vigorous the mycelium is and the earlier the sporangia are formed in it, the more susceptible is the plant. Further evidence for the determination can, in some cases, be drawn from the size and colour of the leaf portions injured and from the comparative speed of growth of the hyphae within the leaf. Plants that come through the test successfully have the necessary resistance and, after the infected leaf has been removed, they are planted in the field and can be used in further crossing and selection. The method, which is used at Svalöf, has been tried with a large number of varieties of potatoes of known

susceptibility and, with few exceptions, the results have agreed with the expectations.

An attempt has also been made to replace the biological test by a simple and precise chemical method, based on the peroxidase content of the leaf sap and yielding clear information about the degree of resistance.

With the ordinary varieties of potato, i.e. *S. tuberosum* varieties, this technique proved comparatively reliable, but the method has its limitations, and is, in the opinion of Kammermann, inferior to the biological test. There is no relation between the peroxidase content and immunity in crosses between *S. tuberosum* and other species of *Solanum*, but Kammermann believes that it might be possible to assess resistance to the stronger races of blight by the peroxidase method.

519. MAI, W. F.,

SPRUYT, F. J.,

LEAR, B. and

FELDMESSER, J.

**Yields of Green Mountain and Cobbler potato varieties grown on golden nematode infested soil.**

Amer. Potato J. 1951 : 28 : 617-25.

In experiments carried out on Long Island, NY, the yields of Green Mountain, a late variety, were more reduced than those of an early variety, Cobbler, on ground containing a large population of viable golden nematode cysts. Yields of both varieties were inversely related to number of cysts in the soil and number of immature females on the roots.

520. ARHANGEL'SKAJA, N. S. and

SLEPUŠKINA, G. P.

**(Scientific achievements in potato growing).**

Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 4 : 73-75. [Russian].

An abridged report on a conference held in February 1951 at the Scientific Research Institute of Potato Farming contained points of interest to potato breeders. As a result of investigations conducted at the institute during the period 1945-1950 the value of many species, varieties and forms of potatoes for breeding for resistance to wart, *Phytophthora*, Colorado beetle, frost, drought and physiological deterioration has been determined. New potato varieties bred at various Soviet institutes include Peredovik [Leading], Moskovskii [Moscow], Uljanovskii [Uljanov], Vyrypaevskii, Volžanin [Volga], Voronežskii [Voronež], Sverdlovskii [Sverdlov], Sibirjak [Siberian], Agronomičeskii [Agronomic], Zvenjevoi [Detachment],



Trudovoi [Labour], Zaozerskii and Partizan [Partisan]. Some varieties show resistance to wart and *Phytophthora*.

The study of resistance to Colorado beetle has shown that it is associated with the demissin content of the leaves. The aim in breeding is to obtain varieties whose leaves contain this glycoside instead of solanin which has no toxic effects upon the beetle.

Methods of testing material for resistance to wart have been developed.

Mention is made of new potato hybrids resistant to frost which were bred at the Salehard station from *Solanum tuberosum* and *S. Schreiteri*. The breeding method involved vegetative rapprochement.

521. BOCZOWSKA, M.

Les pommes de terre résistantes au doryphore. (**Potatoes resistant to Colorado beetle**).

Rev. Hort., Paris 1951 : 123 : 454-55.

Reference is made to the work of Torka (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 2664), using *Solanum chacoense*. The author herself has made observations on the behaviour of Torka's resistant hybrids and shown them to be definitely unpalatable to the insects. The alkaloid contained in *S. chacoense* is different from that in *S. demissum* and it is suggested that hybrids containing both might be a still more promising source of resistant material.

522. NORRIS, D. O.

**Spotted wilt of potato. I. The field disease and studies of the causal virus.**

Aust. J. Agric. Res. 1951 : 2 : 221-42.

An analysis of the component strains of spotted wilt virus, a common field infection of potatoes in New South Wales, was carried out by inoculation to differential hosts and comparison with symptoms produced by five pure strains. The virus affecting potatoes in the field lacks the tip blight strain which occurs in the complex causing spotted wilt of tomato, but the strains designated necrotic, ringspot, mild and very mild are present in both virus complexes. It was shown that the complex lacking the tip blight strain was not the result of a filtering action by potato tissues. Since, with the exception of the potato, the host range of both viruses is identical, it is suggested that the name potato type spotted wilt virus be given to the form affecting potatoes in the field.

The occurrence of synergism between strains of spotted wilt virus is probable, because although

mild and very mild strains are present in the natural virus complex, they are unable to invade potato tissues when in a pure form.

523. KÖHLER, E. and  
ROSS, H.

Das Verhalten deutscher Kartoffelsorten gegenüber verschiedenen Stämmen des X-Virus im Pfropfversuch. I. Mitteilung. (**The reaction of potato varieties to different strains of virus X in grafting experiments. I.**).

Züchter 1951 : 21 : 179-85.

Data are given showing the reaction of 53 varieties of potatoes in the German official collection of potatoes to nine strains and two populations of virus X, special attention being paid to the occurrence of hypersensitivity which ensures field resistance.

524. WATSON, R. D. and  
RANDALL, T. E.

**Curly-top on wild seedling potatoes.**

Plant Dis. Reporter 1951 : 35 : 231-32. (Mimeographed).

Data are given on the field reaction of 11 types of wild potato seedlings to curly-top virus, when tested in Washington State during 1950. At least one or more plants of all the 11 types developed symptoms. Topping improved the technique of testing for curly top reaction.

525. RIEMAN, G. H.,  
DARLING, H. M.,  
HOUGAS, R. W. and  
ROMINSKY, M.

**Clonal variations in the Chippewa potato variety.**

Amer. Potato J. 1951 : 28 : 625-31.

Inheritance of both qualitative and quantitative characters in advanced generations of 11 clonal selections having abnormal characteristics and 5 strains of normal appearance has been studied in northern Wisconsin in an attempt to distinguish those variations determined by pathological and genetic influences, with particular reference to degeneration phenomena. Clonal lines derived from Starks and strain W are symptomless carriers of a mild strain of latent mosaic virus; many differences in their yielding capacities can be associated with degree of virus infection, but in relation to the yielding capacity of a virus free strain, XF, some yield differences appear to be due to other factors. Although it seems probable that mutations are responsible for discontinuous

variations in qualitative characters, such as the white blossoms of Starks WB and the russet tuber skin in Starks RC, it is difficult to recognize those quantitative variations in yielding capacity which are the result of gene mutations.

526. WHEELER, E. J.  
**White potatoes in Japan.**  
Rep. Natural Resources Sect. Gen.  
Hdqs. Allied Powers, Japan 1951 : No.  
142 : Pp. 40. (Mimeographed).

Information on the various aspects of potato production and research in Japan is given. Varietal testing is carried out at many research stations, and a general breeding programme to develop varieties with disease resistance and high starch content now receives considerable attention. Many German varieties have been crossed with potatoes grown in Japan. Several new varieties have already been produced, e.g. Benimaru and Norin [Ministry of Agriculture and Forestry] 1, 2 and 3. *Solanum demissum* has been used in breeding for late blight resistance by the back cross technique; a large number of seedlings have exhibited a high degree of resistance. Recommendations for further improvements in potato production include: development of varieties resistant to diseases, especially to viruses; and increase of the seed of the late blight resistant varieties Kennebec and Sebago to replace the highly susceptible late varieties now cultivated.

527. HASEGAWA, H.  
**(On sweet potato breeding and the variety Norin 3).**  
Jap. J. Genet. 1946 : 21 : 69-70.  
[Japanese].

After a preliminary description of the methods used in Japan for breeding sweet potatoes, a description is given of the new variety Norin 3 [Ministry of Agriculture and Forestry 3]. This variety is a productive type of mid-season maturity; the roots are yellowish white, with high starch content and good culinary qualities. It was raised from the cross Yoshida x 7-539.

528. MILLER, J. C.  
**Louisiana Goldrush.**  
Sweet Potato J. 1951 : 6 : No. 3 : 3-4.

The sweet potato formerly known as L-241, developed by the Louisiana Agricultural Experiment Station (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1976), has been released under the name Goldrush.

529. DOREMUS, G. L.,  
CRENSHAW, F. A. and  
THURBER, F. H.  
**Amylose content of sweetpotato starch.**  
*Cereal Chem.* 1951 : 28 : 308-17.

The amylose content of the starch from 22 varieties ranged from 17.5 to 21.7%. No variety showed promise as material for selection for high amylose content.

530. CALMA, V. C. and  
PANINGBATAN, E. S.  
**Field test of six varieties of sweet potato.**  
*Philipp. Agric.* 1951 : 34 : 84-89.

During trials at Los Baños, Laguna, the variety Tamisang Puti from Catanduanes showed superiority in respect of yielding ability and tuber quality. Segurada was very susceptible to root weevil (*Cylas formicarius*).

## FIBRES

531.  
**Empire Cotton Growing Corporation. Report of the Administrative Council of the Corporation submitted to the thirtieth Annual General Meeting on July 10th, 1951 : Pp. 18.**

Breeding work is reviewed (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2822).

532.  
**Empire Cotton Growing Corporation Report of the Thirtieth Annual General Meeting 1951 : Pp. 8.**

An account of achievements and aims in cotton breeding, by J. B. Hutchinson, is included (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2822).

533. KALIDAS SAWHNEY  
**Progress of Indian cotton. How research has aided quality and yield.**  
*Indian Cott. Gr. Rev.* 1951 : 5 : 100-07.

The work of the Indian Central Cotton Committee during the past 30 years is summarized. Apart from promoting research for the production of improved long and medium staple cottons with increased yields and disease resistance, legislative measures have been taken to maintain the purity of new varieties, to ban inferior cottons and to establish areas which grow one variety only.



534. HUTCHINSON, J. B. and  
MANNING, H. L.

**Recent progress in cotton breeding in Commonwealth territories in Africa and in the Anglo-Egyptian Sudan.**

Brit. Agric. Bull. 1951 : 4 : 169-74.

A survey of the contribution of genetical research to cotton breeding emphasizes the value of recent analyses of differentiation within *Gossypium hirsutum* (cf. Abst. 538). Results indicate that work should be carried out with material of greater variability under conditions of freer gene exchange than found at present in most breeding plots. A wealth of material is available, most of which has never been assessed under African conditions; a major problem is to utilize the wide range without creating an unwieldy programme. Syntheses of new and superior genotypes combining the desirable characters of a large number of parent stocks can only be achieved by selection from a population in which hybridization has been maintained for many generations and in which it is reasonable to suppose that the desirable gene combinations exist. Both rigorous selection during early years and an early return to orthodox inbreeding practices restrict the process of recombination on which the new method is based. Samples taken from the mother stock, studied by the more orthodox plant breeding methods, will provide information on the status of the parent stock at any time during the proposed experiment.

535. PRENTICE, A. N.

**Notes on cotton in Sierra Leone.**

Emp. Cott. Gr. Rev. 1951 : 28 : 178-82.

The persistence of *Gossypium hirsutum* var. *punctatum* among *G. barbadense* in plots grown purely for domestic use in Sierra Leone is compared with the survival of var. *punctatum* in the Egyptian cotton crop (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1190). Although  $F_1$  hybrids occur freely, later generations are genetically unbalanced so that the two species remain virtually distinct. Selection by the grower to produce a steady ratio of both types probably occurs, as *G. barbadense* often exists in a brown-linted form useful for weaving patterns, whereas *G. hirsutum* var. *punctatum* has a higher degree of resistance to jassid, blackarm and bunchy top infections, thus guaranteeing a substantial yield.

536. BROWN, M. S.

**The spontaneous occurrence of amphiploidy in species hybrids of *Gossypium*.**

Evolution, Lancaster, Pa 1951 : 5 : 25-41.

Doubling of the chromosome number occurred

spontaneously in a single flower of an  $F_1$  hybrid of *G. Davidsonii* x *G. anomalum*. The two fertile amphidiploids obtained combined the characteristics of both parents, and were incompatible with *G. hirsutum*, synthesized amphidiploids and trispecific hybrids. Spontaneous doubling of the chromosome number also occurred in two  $F_1$  hybrids of *G. hirsutum* x *G. Armourianum*. The general evolutionary significance of such spontaneous chromosome doubling in *Gossypium* is discussed. The amphidiploid *G. Davidsonii* x *G. anomalum* would be very well equipped to establish itself as a distinct species in a suitable environment, since it is highly self fertile, perennial, genetically isolated from the parental species and other species by a difference in chromosome number, and also isolated from any competing amphidiploid by the incompatibility barrier formed by the *G. Davidsonii* genome. The development of the amphidiploid *G. hirsutum* x *G. Armourianum* into a true breeding hexaploid would be unlikely, on account of its low initial fertility and its interfertility with *G. hirsutum*. The possibility that new strains of *G. hirsutum* with characters of *G. Armourianum* could be developed by introgression is considered.

537. LECOMTE, M.,  
DE COENE, R. and  
CORCELLE, F.

**Observations sur les réactions du cotonnier aux conditions de milieu. (Observations on the reactions of the cotton plant to environmental conditions).**

Publ. Inst. Nat. Agron. Congo Belge 1951 : No. 49 : Pp. 55.

The information analysed in this study is based largely on experiments carried out in the northern part of the Belgian Congo, especially in the Uele forest region where the Bambesa research station is situated. The effects of environmental conditions upon germination, plant height and growth, development of roots, stems, branches, leaves, flowers and seed capsules, and on the density of stand and yield are analysed.

538. HUTCHINSON, J. B.  
**Intra-specific differentiation in *Gossypium hirsutum*.**

Heredity 1951 : 5 : 161-93.

Extensive new collections of *G. hirsutum* from Central America, grown at Shambat, Sudan, and Namulonge, Uganda, form the basis of a detailed discussion of differentiation within the species. The great range of variability

existing in the relatively small area of distribution has made possible a classification into seven well defined races, *Morrilli*, *latifolium*, *Richmondi*, *Palmeri*, *punctatum*, *yucatanense* and *Marie-galante*. These are somewhat disappointing to the breeder of annual cottons as all but one race, *latifolium*, are perennials. Intraracial variability, greatest in the races *punctatum* and *latifolium*, is expressed in characters of agricultural interest but the degree of disease resistance and desirability in other respects are less than in present day commercial varieties. The collections are, however, valuable for the study of species development. The existence of distinct uniform races indicates an advanced state of development. Illustrations are given of the development of diversity in peripheral areas by the synthesis of new characters, in regions where they have a high selective value, by free exchange of genes. This is contrasted with the Vavilov theory of diminishing variability from the centre of origin to the periphery, a condition which arises when exchange of genes is limited by self fertilization and fragmentation of an expanding population in which recombination becomes retarded.

539. ISIKAWA [ISHIKAWA], T.  
(On the hereditary physiological characters of tetraploid cotton).  
Jap. J. Genet. 1946 : 21 : 84-87. [Japanese].

A comparative study has been made of the fresh and dry weights, dry matter content of the cell sap, diurnal fluctuation in water content, osmotic pressure, transpiration rate and carbon assimilation of diploid and autotetraploid strains of *Hiroshimazairai* [Hiroshima Normal] and the allotetraploid Kanno 1. The allotetraploid had a lower percentage dry matter content, lower osmotic pressure and lower transpiration rate than the diploid; the autotetraploid was intermediate.

540. ARZUMANOVA, A. M.  
(Flowering and fertilization in cotton).  
Agrobiologija (Agrobiology) 1951 : No. 1 : 71-84. [Russian].

The results of investigations of multiparental cross pollination in cottons conducted at the USSR Institute of Plant Industry are reported. The material included the *Gossypium hirsutum* varieties 13656, S-935, 1101, Krasnolistnyĭ Akala [Red Leaf Acala] and a *G. barbadense* variety 35-1. All the above varieties were used as female parents in crosses with (a) mixed pollen of all varieties, including self pollen, (b)

mixed pollen of all varieties except self pollen, (c) mixed pollen of one foreign variety and self pollen, (d) self pollen and the pollen of another variety applied 10, 20 and 45 minutes afterwards and (e) pollen of a foreign variety and self pollen applied 10, 20 and 45 minutes afterwards. In some of the experiments, the cotton referred to as *G. Hapi* variety 02670 was included as a pollinator.

It was found that the female varieties showed a preference for the pollen of varieties which had similar requirements to themselves. For instance, 13656 preferred self pollen to other pollen or the pollen of the closely related variety, 5-935, when self pollen was not available. The number of varieties used to prepare a pollen mixture, the biological properties of the individual varieties and the order in which their pollen was applied had important effects upon the results. The selective capacity of a female variety changed with variation in the pollen mixture.

541. TOMINAGA, Y.  
(On artificially produced tetraploids of cotton).  
Jap. J. Genet. 1946 : 21 : 60-61. [Japanese].

Tetraploid strains of seven Japanese varieties have been produced after treatment with colchicine. They showed the usual gigas characteristics and in addition were highly fertile.

542. BALLS, W. L.  
Spinning on the farm.  
Emp. Cott. Gr. Rev. 1951 : 28 : 158-77.  
The methods and results (cf. *Plant Breeding Abstracts*, Vol. XVI, Abst. 553) of the spinning test technique developed at Giza, Egypt, by the late H. A. Hancock are discussed. By this technique the value of new varieties and selections can be assessed and any deterioration in the quality of varieties already established is readily detected. Comment is made on the omission to provide for similar tests at the Namulonge Cotton Research Station, Uganda.

543.  
Mais uma variedade de algodão de fibra longa. (Another cotton variety with long lint).  
Bol. Minist. Agric., Brasil 1946 : 35 : Nos. 7-12 : p. 74.

Reference is made to the production in Brazil of a variety Delfos, with a lint length of 34/36 mm., and of the variety Piratininga, also characterized by long fibre.



544. GODLEVSKIĬ, N.  
(Crimean masters of cotton growing).

Kolhoznoe Proizvodstvo (Collective Farming) 1951: No. 7: 37-38. [Russian].

Reference is made to a new highly productive and early variety, 611-B, which produces a heavier boll and yields longer fibre than S-3173.

545. GADKARI, P. D. and KOCHREKAR, B. S.  
A lintless mutant in Gaorani cotton.  
Indian Cott. Gr. Rev. 1951: 5: p. 107.

A mutant bearing lintless bolls was isolated from a Gaorani selection of *Gossypium arboreum* race *indicum* growing at the Khargone Plant Breeding Station, India. The mutant had a somewhat shorter growth habit but otherwise resembled normal plants.

546. PERRIER DE LA BATHIE, H.  
Distribution et écologie du *Gossypioïdes brevilanatum* (Hochr.) Hutchinson de Madagascar. [Distribution and ecology of the *G. brevilanatum* (Hochr.) Hutchinson from Madagascar].  
Rev. Bot. Appl. 1951: 31: 231-32.

*G. brevilanatum*, whose distribution and ecology in Madagascar are described, is useless as a textile plant. Its Malagasy name is san hasina [false cotton].

*Gossypium herbaceum* var. *Perrieri*, which is recorded south of the region where *Gossypioïdes brevilanatum* is found, is also thought to be indigenous to Madagascar. It differs from typical *Gossypium herbaceum* in several features and is of interest owing to its short, but very strong lint, its thick capsules which resist most cotton pests, and its adaptation to arid, desert conditions.

547. IGNATOV, V.  
(The progress made in cotton growing during the first post-war five year plan period).  
Socialističeskoe Seljskoe Hozjaïstvo (Socialistic Agriculture) 1951: No. 8: 25-31. [Russian].

Mention is made of the recently developed varieties 137-f, S-1470, 138-f, 139-f, S-1375, D-18, 311, S-1225 and 5904-1, which are being multiplied. They are remarkable for high yields, quality and length of fibre, high ginning percentage and early maturity. All these varieties are suitable for combine harvesting. Variety 108-f is the most widely cultivated of existing cottons. It is early, productive and

shows resistance to diseases. It has a growth period of 142 to 145 days and a ginning percentage of 35 to 36%.

Other existing varieties include the early, high-yielding cottons S-450, 555, 1298, 611-b, S-3210, S-3173 and OD-1, which produce fibre of medium thickness, and varieties 2 and 3 producing 40 mm. long fine fibre.

548. DASTUR, R. H.  
The "bad opening" of bolls in the Egyptian cottons in the Gezira scheme, Anglo-Egyptian Sudan.  
Emp. Cott. Gr. Rev. 1951: 28: 183-94.

An account is given of the condition known as "bad opening," the cause of which has not yet been determined. In the Punjab, where *Gossypium hirsutum* is grown, premature boll dehiscence occurs when both seeds and lint are immature, whereas prematurely opened bolls of *G. barbadense* grown in the Sudan have sound well developed seed, the lint alone being immature.

It is suggested that new Egyptian varieties which have inherited blackarm resistance from American cottons, may have also inherited the tendency towards "bad opening" possessed by the American types. The need for testing these new Egyptian strains on soils where "bad opening" usually occurs is stressed.

549. KULKARNI, Y. S. and PATEL, M. K.  
A preliminary note on the inheritance of blackarm resistance in some strains of *Gossypium herbaceum* L.  
Indian Cott. Gr. Rev. 1951: 5: 148-52.

Data obtained from the  $F_1$ ,  $F_2$  and back cross progenies of the Kumpta Farm strain of *G. herbaceum* var. *acerifolium* x R 22 (a Russian introduction of *G. herbaceum*) indicate that reaction to *Xanthomonas malvacearum* depends on a single pair of factors; the gene for susceptibility is partially dominant (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2234).

550. KNIGHT, R. L.  
The genetic control of blackarm disease (*Xanthomonas malvacearum*) in cotton.  
5 Congr. Int. Path. Comparée, İstanbul 1949: Pp. 11.

The results of 14 years' work by which the five main genes,  $B_1$ ,  $B_2$ ,  $B_3$ ,  $B_4$  and  $B_5$ , controlling resistance to *X. malvacearum* have been isolated and identified are summarized. An outline of the reactions of 20 species of *Gossypium* to the pathogen, with particular reference to the

members of Hutchinson's series *Herbacea* and *Hirsuta*, is followed by a discussion of synthesis of resistance by natural selection and methods by which resistance can be developed artificially by hybridization. Separate detailed reports have already appeared in numerous issues of *Plant Breeding Abstracts*.

551. MUHAMMAD AFZAL and GHANI, M. A.

**Studies on the cotton jassid (*Empoasca devastans* Dist.) in the Punjab.**

**XI. Effect of agronomic factors on the incidence of jassid attack.**

Pakistan J. Sci. Res. 1949 : 1 : 41-62.

Data concerning reaction to jassid attack indicate that a variety with marked hairiness and tough leaf veins, such as 4F, has greater resistance than the more succulent Victory. Hairiness and toughness increase with close spacing.

552. DARLING, H. S.

**Pink bollworm, *Platyedra gossypiella* (Saund.), as a pest of cotton at Zeidab, Northern Sudan.**

Bull. Ent. Res. 1951 : 42 : 157-67.

The choice of a quick maturing cotton variety, such as Coker-Wilds 11, restricts damage due to the pink bollworm which destroys a large part of the potential yield in this area.

553. FRÖIER, K.

Svalöfs spånadslin Kristina. (The Svalöf textile flax Kristina).

Allmänna Svenska Utsädesaktiebolaget (General Swedish Seed Co.) Svalöf 1951 : 49-51.

In 1951 the General Swedish Seed Company put the Kristina flax, bred by I. Granhall from the cross 041 x (Herkules x 068), on the market. The line 041, outstanding from the fibre standpoint, is derived from a land flax from Märserum in Blekinge, and 068 was obtained by pedigree selection from Italian white flowered flax, probably an oil or dual purpose type. Comparative trials, which have included also Herkules, Gerda and Margareta, have shown the marked advance Kristina represents in regard to straw strength, earliness, quality of fibre and yield of straw (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 651).

554. FRIEDERICH, J. C.

Vezelvlasrasen- en -cultuuronderzoek. (Variety and cultivation trials of fibre flax).

Versl. Cent. Inst. Landbouwkundig Onderz., 's-Gravenhage 1950 : 105-09.

In these trials in various districts in Holland,

Concurrent, the control, was surpassed by Wiera and Hylkema 1835 in yield of straw and long fibre and in resistance to diseases such as scorch and rust. Other remarkably scorch resistant types were the Engelum selections 4052, 51-VII and 51-XII. Wiera and Percello can apparently stand heavier nitrogen manuring than the other varieties tested.

Susceptibility to browning of the seed capsules was recorded for the following varieties, arranged in descending order of resistance: Wiera, Wiersema 43/35, Hylkema 1835, Formosa, Concurrent, Hollandia, Percello and Norfolk Earl.

555. RUDAKOVA, M. M.

**(A study of the dynamics of seed swelling for early determination of the earliness of a variety).**

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 12 : 50-53. [Russian].

At Gorjkiï, the seed of hemp and sunflower varieties having short growth periods swelled more rapidly after soaking for 100 hours than the seed of later-maturing varieties.

556. DEMKIN, A. P. and

ASTAHOVA, A. V.

**(Open intervarietal cross pollination of hemp).**

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 11 : 19-26.

The effects of free cross pollination upon hemp varieties, when grown together in pairs for several years, were investigated at the Institute of Fibre Plants.

It was found that all varieties produced offtypes. The proportion of these plants was between 14.9% and 37.7%. In some varieties, such as N. Severskaja, yields of straw and fibre increased and yield of seed decreased. The reverse effect of hybridization upon the production of straw and fibre, and seed was observed in Južnaja [Southern] and Proskurovskaja.

The growth periods of some varieties also changed as a result of hybridization. For instance, Južnaja, when open pollinated, matured earlier and N. Severskaja matured later.

The above effects of pollination were most marked when the varieties grown together were planted at different dates so that their flowering periods coincided in time.

It is concluded that, with a few exceptions where one variety may improve another variety, the method of free cross pollination cannot be recommended to hemp growers. The exceptions



are: some local varieties in the Gorjov province and the Tartar and Baškiran republics, which may benefit from cross pollination with Staro-Oskol'skaja Ulučšennaja [Improved Staryi Oskol]; the local Siberian varieties, which may improve as a result of cross pollination with N. Severskaja; and N. Severskaja, which may improve after interplanting with Proskurovskaja. In the last-named instance, the fibre yield of N. Severskaja was increased by 22%, seed production was as high as in the initial variety, and the growth period remained short.

557. RJUMINA, G. A.  
(Changes in structure of the stem of hemp due to the conditions under which it passes through the light phase).  
Agrobiologija (Agrobiology) 1951 : No. 1 : 157-59. [Russian].

The growth periods of Novgorod-Severskaja [Novgorod-Severskii], SOU [Improved Staryi Oskol], JuS-1 [Southern Maturity-1] and Južnaja [Southern] were reduced after exposure to photoperiods of 10 hours. The effect of 20 hour photoperiods was the reverse. Stem analyses of the female plants showed that short photoperiods had an adverse effect upon the fibre production of the northern varieties and long photoperiods upon that of the southern varieties.

558. BAGGE, H. and LARSEN, A.  
Forsøg med spindhamp. Stamme-, kultur-, gødnings- og kalkforsøg 1941-1948. (Experiments with hemp for spinning. Trials relating to strains, cultivation, manuring and liming, 1941-48).  
Tidsskr. Planteavl 1951 : 54 : 628-85.

The varieties of *Cannabis sativa* tested in these Danish trials included Yugoslav, Latvian, Italian, American, German and Russian strains. On the basis of the results either the variety Dr. Schurigs or Sorau strain I were recommended for cultivation.

559. MENDES, C. H. T.  
Observações citológicas em *Aloë* sp. (Cytological observations on *Aloe* sp.).  
Bragantia, S. Paulo 1950 : 10 : 37-48.

Descriptions are given of meiosis in pollen mother cells in a plant which on morphological grounds was thought to be a hybrid between *A. macracantha* and *A. Saponaria*; 7 haploid

chromosomes were observed and microsporogenesis was normal. Somatic cells contained 14 chromosomes, 4 long pairs and 3 short. The majority of cells had 2 nucleoli but nuclei with 1 and with 3 also occurred, and 3 satellites were also observed in many nuclei, which is taken as a confirmation that the plant was a hybrid.

560. DE MENEZES, O. B.  
Tratamento do caroá (*Neoglaziovia variegata* Mez.) pela colchicina. [Treatment of *N. variegata* Mez. with colchicine].

Rev. Agric., S. Paulo 1951 : 26 : 185-92.  
Seeds were treated with colchicine solutions of various concentrations and measurements were made of the stomata in the leaves of the resulting seedlings. Significant increases in stomatal size in the treatments with 0.25 and 0.125% colchicine suggest that polyploidy had been induced.

561. MUHLE LARSEN, C.  
Forædling af Pil. (Willow breeding). Dansk Skovfor. Tidsskr. 1948 : 33 : 370-74.

A brief review is given of the aims and methods of willow breeding pursued at the Hørsholm Arboretum in Denmark.

562. SIPKES, C.  
Een merkwaardige, mogelijk belangrijke schietwilg (*Salix alba* Rockanje). [A curious and possibly important white willow (*S. alba* Rockanje)].  
Tijdschr. Ned. Heidemaatsch. 1951 : 62 : 216-17.

Named after Rockanje in Holland where it was found growing, this willow is thought possibly to be a hybrid between *S. alba* and *S. fragilis* as its branches are not excessively tough. Some of the desirable features of the hybrids between these two species are mentioned.

## SUGAR PLANTS

563. BARNES, A. C.  
The Natal sugar industry.  
World Crops 1951 : 3 : 375-78.

During the past 25 years the initial predominance of Uba sugar cane has given way to imported material from Coimbatore. As seed would not set under local conditions, breeding work was restricted to selecting canes for adaptability after a period of quarantine. Recent research on the factors preventing natural pollination has made successful hybridization possible under artificial conditions; N : Co. varieties developed

locally are now being cultivated, often in place of formerly popular Coimbatore varieties.

564. SUNILKUMAR MUKHERJEE.  
**Survey and collection of wild sugar-cane relatives from India.**  
Indian Fmg. 1950 : 11 : 404-07.

A living collection of many varieties and species of *Erianthus*, *Miscanthus*, *Narenga*, *Saccharum* and *Sclerostachya* from southern and eastern India is being studied at Coimbatore. Wide variation is evident among strains of *Saccharum spontaneum* from different regions; valuable characteristics among the specimens include high sucrose content (8-9.9%), protogyny, tall erect habit, vigorous growth, profuse tillering, tolerance of heavy rainfall, and resistance to water logging, frost, saline conditions, drought and most common diseases. It is expected that many of the desirable qualities of wild strains will be combined in new varieties of sugar cane by hybridization.

565. NISHIYAMA, I.,  
YAMADA, I.,  
FUROSATO, K. and  
KONDO, N.  
**(Chromosome studies with sugar cane).**  
Jap. J. Genet. 1946 : 21 : 56-57. [Japanese].

Chromosome numbers, and in some cases meiotic configurations, are given for a series of *Saccharum spontaneum* samples and for *S. robustum*. Meiotic configurations are also given for the parents and F<sub>1</sub> offspring of six sugar cane crosses, mostly involving commercial clones.

566. YUSUF, N. D.  
**Methods for inducing flowering and controlling the times of flowering in sugarcane. I. Studies into the effect of photoperiod on flowering in sugarcane.**  
Pakistan J. Sci. 1950 : 2 : 36-49.

The results of experiments carried out at the Sugar Cane Breeding Station, Coimbatore, to determine the relationship between photoperiod and time of flowering have shown that response is more obvious in strains of *Saccharum spontaneum* than in varieties of *S. officinarum*.

After being subjected to 22 hours of darkness per day for 2 months, flowering was induced in two varieties of *S. spontaneum*, Burma and Gerahbon, which do not normally flower at Coimbatore; similar treatment, however, failed to promote flowering in Assam 196 and G 3011.

When subjected to 9 hours of daylight, the nonflowering variety Assam 301 flowered freely. Flowering in Sorapara 270, a form of *S. spontaneum* which flowers infrequently, was induced 1½ months earlier under short day conditions of 11 hours and the same variety continued flowering 2½ months later than usual when subjected to long periods of darkness; in this way the flowering period was extended over 4 months instead of 2-3 weeks. Although flowering was delayed in numerous varieties of *S. officinarum* by changing the photoperiod at critical stages during the life of the plant, no instance of premature flowering was recorded.

567. KHANNA, K. L. and  
CHACRAVARTI, A. S.  
**Studies in the chemistry of sugar-cane juice in relation to claribility in gur manufacture.**

Indian J. Agric. Sci. 1950 : 20 : 25-37.

Juice analyses of numerous varieties have been undertaken to determine the characteristics essential for producing high quality gur. Co. 513 and 313 proved superior in respect of degree of juice clarification; both contain a low percentage of colloids and ash and have high phosphate content.

568.  
**Expedition brings new canes from New Guinea.**

Aust. Sug. J. 1951 : 43 : 253-65.

The preliminary report of the 1951 Queensland expedition to the central highlands and low lying coastal areas of New Guinea indicates that many specimens from native gardens show promise as commercial sugar canes. A total of 165 different types were collected and sent by air to Brisbane where they are growing under quarantine conditions. Some of the wild specimens show exceptional hardiness, vigour and sugar content; they will be incorporated into the breeding programme. It is thought that further evidence has been obtained concerning the centre of origin of *Saccharum* species.

569. KING, N. J.  
**The increasing importance of new cane varieties to our industry.**

Cane Gr. Quart. Bull. 1951 : 15 : 28-29.

A brief summary is given of the importance of varietal improvement in Queensland during the past 20 years, with indications of further advances in breeding and additional introductions which may increase production particularly in northern tropical areas.



570. B., J. H.  
**The Bureau Expedition to New Guinea.**  
Cane Gr. Quart. Bull. 1951 : 15 : p. 14.  
The discovery of a giant variety of *Saccharum robustum* in the Chimbu region of the central highlands of New Guinea is reported. It has been named 51 NG 91. Some sticks measure 1½ ins. in diameter, having internodes 18 ins. in length; the leaves are often 4 ft. long and 2½ ins. across. Although the canes have a very tough rind the sugar content is high. Juice from a young stalk showed a brix of 13°, compared with 7–10° for most varieties of *S. robustum*.
571. OVADIA, J.  
Une plante exotique aux multiples utilisations: la canne à sucre. "*Saccharum officinarum* L." (An exotic plant with many uses: the sugar cane, *S. officinarum* L.).  
Bull. Un. Agric. Égypte 1951 : 49 : 63–70.  
This article contains some notes on the history of sugar cane in Egypt and on the varieties cultivated there.
572. LOH [Lo], C. S. and  
WU, T. H.  
(Intergeneric hybrids between *Saccharum* and *Miscanthus*).  
Kan Chê Yen Chiu (Sugarcane Research), Taiwan 1950 : 4 : 215–28. [Chinese].  
A series of hybrids have been raised from crosses between standard sugar cane varieties and *M. japonicus* and between *S. officinarum* x *S. robustum* and *M. japonicus*, the aim being to incorporate the subtropical temperature adaptability of *M. japonicus* into commercial varieties. The intergeneric hybrids were of two types, one deriving an unreduced chromosome complement from the female parent and the other a reduced complement. Though the F<sub>1</sub> hybrids were highly male sterile, several back crosses were made to commercial varieties. The back crosses are of interest on account of their moderate temperature requirements, high sugar content and apparent freedom from disease.
573. MALLIK, A. K.  
**A preliminary study in drought resistance of sugarcane.**  
Indian J. Agric. Sci. 1950 : 20 : Part 1 : 143–46.  
A method is described by which varieties of sugar cane can be tested for drought resistance under experimental conditions simulating drought of varying severity.
574. VOLP, P.  
**An outline of disease control in the Mulgrave area.**  
Cane Gr. Quart. Bull. 1951 : 15 : 30–32.  
Brief descriptions of gumming, downy mildew, leaf scald, chlorotic streak, red stripe, mosaic and yellow spot diseases of sugar cane in the Mulgrave area of Queensland include notes on the relative susceptibility of commonly grown varieties.
575. BUZACOTT, J. H.  
**Note on varietal susceptibility to yellow spot.**  
Cane Gr. Quart. Bull. 1951 : 15 : 23–24.  
A provisional classification of 37 approved cane varieties grown in Queensland is presented, based on their reaction to yellow spot (*Cercospora Kopkei*) under field conditions at the Meringa Sugar Experiment Station.
576. HAROON KHAN  
**A severe outbreak of *Macropes excavatus* Distant, the black bug of sugarcane in Sind.**  
Pakistan J. Sci. 1949 : 1 : 71–72.  
Investigations revealed that of the three varieties extensively cultivated, Co. 331 was very susceptible to black bug whereas Co. 312 and Co. 421 show some degree of resistance.
577. CHONA, B. L. and  
RAFAY, S. A.  
**Studies on the sugarcane diseases in India. I. Sugarcane mosaic virus.**  
Indian J. Agric. Sci. 1950 : 20 : 39–68.  
**Studies on the sugarcane diseases in India. II. The phenomena of natural transmission and recovery from mosaic of sugarcane.**  
Ibid. 1950 : 20 : 69–78.  
Data are presented concerning inoculation experiments with three strains of mosaic virus and an investigation of the degree and method of natural transmission. Although virus from any one source is capable of producing disease symptoms on all other varieties tested, natural transmission only occurs in certain restricted localities of the submontane tract in northern India; the insect vector remains undetermined.
578. KING, N. C.  
**Methods and results of sugarcane mosaic resistance and tolerance tests.**  
S. Afr. Sug. J. 1951 : 35 : 443–45.  
The results of field trials to determine the

mosaic tolerance of four canes grown commercially in Natal indicate that all varieties are susceptible. N : Co.310 and Co.301 are capable of recovering from the disease but N : Co.291 and Co.281 show a higher degree of susceptibility and rarely recover from infection.

579. ABBOTT, E. V.  
**Sugarcane disease work at the Houma station during 1950.**

Sug. Bull. N.O. 1951 : 29 : 392-98.

Numerous CP varieties and foreign introductions, including several POJ, Coimbatore and Barbados varieties, have been undergoing trials for resistance to mosaic virus, brown spot (*Cercospora longipes*) and various seed piece rots; most of the canes were tested as potential breeding material rather than for commercial adaptability.

580. COSTA, A. S. and  
PENTEADO, M. P.  
**Corn seedlings as test plants for the sugar-cane mosaic virus.**  
Phytopathology 1951 : 41 : 758-63.

Seedlings from inbred lines and varieties of maize have been found to be very satisfactory as test plants for sugar cane mosaic virus at the Instituto Agronómico, Campinas, Brazil. Use of inoculum from maize plants is also considered to be advantageous for inoculating sugar cane seedlings in breeding. Possibly, maize lines and varieties could be used for differentiating virus strains.

581. SIMON, E. C.  
**Report on new sugar cane varieties.**  
Sug. Bull. N.O. 1951 : 29 : 368-70.

Comparative data are provided on the performances of newly released and promising unreleased varieties at the Baton Rouge and Houma stations, Louisiana.

582. GOUAUX, C. B. and  
TAGGART, W. G.  
**Test fields in the sugar cane belt—1950.**  
Sug. Bull. N.O. 1951 : 29 : 345-52.

Detailed results of the trials of sugar cane varieties in eight different localities of Louisiana are presented.

583. HEBERT, L. P.,  
MATHERNE, R. J. and  
ARCENEUX, G.  
**Results of sugarcane variety tests in Louisiana during 1950.**  
Sug. Bull. N.O. 1951 : 29 : 353-61.

In field trials conducted as in former years,

CP 44/101 (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 412) outyielded all other varieties in average yield of sugar per acre. CP 43/47, released in 1950 (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2475), averaged less than CP 44/101 but was superior to other commercial varieties, including CP 36/105. The stalks of CP 43/47 are of uniform height and consequently well adapted to machine harvesting.

Data concerning the performances of unreleased canes show that none approached the yielding capacity of CP 44/101 but CP 43/33, 44/92, 44/153 and 45/184 compared favourably with CP 36/105.

584. STEVENSON, G. C.  
**Report on a visit to Guadeloupe April, 1951.**

Bull. B.W.I. Cent. Sug. Cane Breed. Sta. 1951 : No. 35 : Pp. 12.

Information is presented concerning growing conditions in Guadeloupe, in respect of the requirements of sugar cane varieties, so that the choice of canes sent for trial from the BWI Central Sugar Cane Breeding Station, Barbados will be suitably modified in future. A survey of the present varietal situation shows that the once widely grown POJ canes have been largely replaced by varieties bred in Barbados; the latter include B 37161, 37172 and 34104. Details are given of promising canes undergoing trial.

585. ZANINI, E. and  
TARDO, S.  
Sperimentazione su alcune varietà di sorgo zuccherino. (**Experiments with certain sweet sorghum varieties**).  
Lav. Ist. Bot. Palermo 1949 : 13 : Pp. 18.  
ZANINI, E. and  
TARDO, S.  
Individuazione di varietà di sorgo zuccherino a basse esigenze termiche. (**Recognition of sweet sorghum varieties with low heat requirements**).  
Ricerca Scientifica 1948 : 18 : 1350-51.

A brief historical account is given of the cultivation of sweet sorghum in Italy and in Sicily; all varieties grown to-day can be traced back to two original lines, one from Japan, which gave rise to the Minnesota Early Amber group with a short maturation cycle, and one from Africa which gave rise to the groups with medium and long maturity periods. A report is given of tests carried out in Sicily in 1947 with a number of varieties obtained from continental Italy or the USA. The highest



yield was obtained from the variety Rosso Lombardo [Lombardy Red] with 28.2 q. of seed and 360 q. of cane per ha., followed by Precoce Bottrighe 1226 [Bottrighe Early 1226] with 21.0 q. seed and 336 q. cane. The highest sugar content was found in the juice of Precoce Bottrighe 1226, with 57.7% (dry weight); Rosso Lombardo gave 53.0%.

Two of the varieties tested, Waconia Orange 790 and Waconia tipo Orange, gave a very low germination percentage when sown at 23°C. but germinated normally when sown in December with an air temperature of 15°C. This sowing gave a full crop of seed on 15 August, suggesting that genotypes exist from which it would be possible to select sweet sorghum varieties capable of being grown as a winter cereal in climates such as that of Sicily.

586. BREWBAKER, H. E.  
**Improved research facilities at Longmont.**

Through the Leaves, Colorado 1951 : 39 : No. 4 : 13-14.

Mention is made of a new sugar beet variety bred at the Longmont Experiment Station, Colo., which has shown resistance to leaf spot and cold or frost injury, and an increase of at least 16% in total sugar production compared with the best variety previously cultivated.

587. ERNOULD, L.  
La variabilité comparée de betteraves sucrières diploïdes, mâles stériles et tétraploïdes. (**The comparative variability of diploid, male sterile, and tetraploid sugar beets**).  
Publ. Inst. Belge Amélior. Better. 1951 : 19 : 139-45.

Analyses were made of root weight and sugar content in (a) diploid sugar beets as represented by a commercial variety and the male sterile types, US 6101 and US 6114, and (b) two tetraploid lines comprising respectively 95% and 98% of tetraploids. The tetraploids and the male sterile beets clearly exhibited less variation than the diploids, a finding of possible interest where very homogeneous material is required.

588. BOUGY, E.  
Dissociation en  $F_7$  de l'hybride Vauriac x Vilmorin A. (**Segregation in the  $F_7$  of the hybrid Vauriac x Vilmorin A**).  
Publ. Inst. Belge Amélior. Better. 1951 : 19 : 65-69.

This experiment on the effect of negative and positive selection for sugar content in beets (cf.

*Plant Breeding Abstracts*, Vol. XX, Abst. 424, and Vol. XXI, Abst. 428) has now reached the  $F_7$ . From a graph of the results it appears that the negative selection has resulted in a homogeneous population as regards sugar content, which is equal to or even slightly lower than that of the Vauriac parent; the shape and colour of Vauriac did not reappear. Positive selection, on the other hand, produced a population homogeneous for sugar content and colour and shape of the root, all three characters resembling the parent Vilmorin A. High sugar content thus appears to be closely associated with morphology.

589. ROSNOWSKI, S.  
Badania nad biologią buraków cukrowych. II. Wpływ jarowizacji nasion buraków na tworzenie się pośpiechów. (**Studies on the biology of sugar beets II. The effect of vernalization of beet seeds on the occurrence of bolters**).  
Pam. Państw. Inst. Nauk. Gospod. Wiejskiego 1948 : 19 : Ser. C. : 184-203.

Experiments on the effects of vernalization on bolting in sugar beets showed that the percentage of bolters in the control plots was 0-4% whereas amongst beets from vernalized seed the proportion was 0.2-13%. When vernalization was repeated with seed from plants derived from already vernalized seed the number of bolters decreased and this decrease was greater, the greater the original tendency to bolting. It is pointed out that vernalization could be applied in improving seed material.

In another series of experiments, seed was collected separately from bolters in two beet strains, one characterized by high sugar content and the other by high yield. On sowing, bolters and nonbolters were obtained from each kind of beet. Roots of these plants were planted and the seed used to study the effect of vernalization on seeds with a known hereditary tendency to bolting, evident in the one case and latent in the other. Vernalized seeds of the beets with high sugar content produced a higher percentage of bolters than the unvernallized controls, this effect being observed in seeds from the nonbolting plants as well as in seeds from bolters; in the latter case the number of bolters was very high.

Whether vernalized or not, seeds derived from the nonbolting beets gave about two and a half times fewer bolters than seeds from bolters, hence it is concluded that vernalization reveals the incidence of bolting.

590. MATSUMURA, S.,  
MOCHIZUKI, A. and  
SUZUKA, O.  
**(Cytological and genetical investigations with sugar beet III. The sugar content of intervarietal hybrids and polyploids).**  
Seiken Jiho (Biological Report) 1950 :  
No. 4 : 1-11. [Japanese].

Letting Z represent the genome of sugar beet, F, of fodder beet, and R of table beet, plants of the genomic constitution ZZZZ had larger roots and higher sugar content than ZZ. A similar superiority was shown by ZZF plants over RZ. RZZ plants had a higher sugar content than RZ though the roots were smaller.

Some individuals with a high sugar content and resistance to fungous diseases were obtained in the F<sub>2</sub> progenies of crosses between sugar beet and wild representatives of *Beta maritima* and *B. vulgaris*.

591. MOCHIZUKI, A. and  
MATSUMURA, S.  
**(Cytological and genetical investigations with sugar beet. IV. Triploids and their yields).**  
Seiken Jiho (Biological Report) 1950 :  
No. 4 : 12-16. [Japanese].

Triploid strains of the Japanese variety Honiku 398 yield more than either the diploids or tetraploids. The latter have a higher concentration of sugar but probably require a longer growing period to reach their maximum size.

592. COPPENS, R.  
Méthode Sachs-le-Docte, digestion à froid pour le dosage du sucre dans les betteraves sucrières. **(The Sachs-le-Docte cold extraction method for estimating the sugar content in sugar beets).**

Rev. Agric., Bruxelles 1951 : 4 : 878-82.

Differences discovered between the results of analyses of sugar content by the government laboratories and sugar refineries in Belgium led to this detailed study, carried out by the National Laboratory for Analyses at Gent, of the Sachs-le-Docte extraction technique and factors affecting its efficiency.

593. ERNOULD, L.  
Les possibilités de lutte contre la jaunisse de la betterave. **(The possibilities of controlling virus yellows of beet).**  
Publ. Inst. Belge Amélior. Better. 1951 :  
19 : 71-138.

The concluding section of this paper examines

the possibility of breeding yellows resistant beets, reviewing the difficulties to be overcome and the work that has been done at the Tirimont Institute for Beet Breeding, Belgium, in the search for resistant types among sugar and forage beets, the wild and cultivated races of *Beta vulgaris*, hybrids of cultivated *B. vulgaris*, and other species of *Beta*.

594. THOMPSON, E. G.  
**Trials of sugar beet strains.**

Brit. Sug. Beet. Rev. 1951 : 20 : 31-34.

Data are presented concerning trials carried out at 18 centres in Britain by the British Sugar Corporation in cooperation with the National Institute of Agricultural Botany from 1947 to 1950. The 14 varieties are listed with respect to their relative yields of washed roots, tops and extracted sugar, average percentage of sugar per root and tendency to bolt.

## STIMULANTS

595. BENNETT, R. R.,  
HAWKS, S. N. (JUN.) and  
GARRISS, H. R.  
**Tobacco varieties in North Carolina.**  
Ext. Circ. N.C. Agric. Ext. Serv. 1951 :  
No. 302 : Pp. 19.

This bulletin is a revised edition of that summarized in *Plant Breeding Abstracts*, Vol. XVIII, Abst. 1745. Tables provide information on over 40 varieties with regard to their origin, suitability to soil types, fertility levels and the different tobacco growing belts in North Carolina, disease resistance, growth characteristics, average sucker count per plant per season, and harvesting and curing properties.

596. PASQUALE, F.  
Lo stato attuale della coltivazione del tabacco in Italia. **(The present position of tobacco cultivation in Italy).**  
Tabac, Rome 1950 : 7 : Nos. 1-4 : 39-52.

Reference is made to the history of tobacco growing in Italy, to the districts in which *Nicotiana Tabacum* and *N. rustica* are cultivated and to the various types of tobacco introduced by O. Comes who made a study of the phylogeny of tobacco varieties. The work of the Scafati Experimental Institute for Tobacco Cultivation, whose publications are regularly reviewed in *Plant Breeding Abstracts*, has been concerned with studies on the genetics, acclimatization, selection, hybridization, morphology, physiology, chemistry, fermentation, pathology and entomology of tobacco.



A list is given of the varieties in cultivation in 1949, some of which are also illustrated and described.

597. WOODS, M. W. and  
DUBUY, H. C.

**The action of mutant chondriogenes and viruses on plant cells with special reference to the plastids.**

Amer. J. Bot. 1951 : 38 : 419-34.

Cytological studies of plastids in photosynthetic cells of *Nicotiana Tabacum* have revealed numerous abnormal chloroplasts, containing a few large grana, in a homochondric condition or in all combinations with normal plastids in cells of variegated leaves. Some abnormal chloroplasts develop from mutant chondriogenes within otherwise normal cells, others from normal or mutant mitochondria in cells infected with tobacco mosaic virus. Further modifications affecting all plastids of the cells are determined by a gene for the white burley character.

Mutant plastids are inherited by the progeny of a variegated x normal cross but not of the reciprocal cross, thus indicating a matroclinous type of inheritance.

598. TIRELLI, M.

Contributo alla conoscenza delle enazioni del tabacco. (**Contribution to the knowledge of enation in tobacco**).  
Tabacco 1951 : 55 : 179-210.

A general account is given of the phenomenon of enation in general and in tobacco in particular. Though normally caused by virus, certain hereditary types of enation have been observed and reference is made to some unpublished work of Donadoni, who in 1932 observed such plants in a tobacco variety Soluk grown in the Lecce province of Italy. Selfed seed from these plants displayed the character of enation in varying degrees, some of them being markedly deformed. By continued selfing and selection for normal type, by 1940 a population free from any trace of abnormality was obtained.

Anomalous plants also appeared in the open-pollinated progeny of the original plants, and these when crossed with normal plants of other varieties transmitted the anomaly in varying degrees (cf. *Plant Breeding Abstracts*, Vol. X, Abst. 821).

Histological descriptions are given of some leaves of Virginia Bright tobacco showing enation. It is thought to be a form of tumour development which may be occasioned by a

variety of stimuli, internal and external, but possibly more readily in some plants or lines than in others.

599. ROGOZIŃSKI, A. and  
ROŹNOWSKA, L.

Wpływ regulowania ilości torebek nasiennych u tytoniu oraz izolowania nasienników na ilość i jakość plonu nasion. (**The effect of regulation of the number of seed capsules in tobacco and of isolation of seed heads on the yield and quality of seed**).

Pam. Państw. Inst. Nauk. Gospod. Wiejskiego 1948 : 19 : Ser. C. : 137-61.

Four varieties of *Nicotiana Tabacum*, Kentucky 3002, Virginia Joyner, Virginia Conqueror and Trebizond, and one variety of *N. rustica*, Machorka Komarno, were used for experiment. Tables of results show the average number of seed capsules per plant, the 1000 seed weight and the germination energy and germination capacity of the seed for each of the five varieties. Kentucky 3002 and Machorka Komarno were distinguished by very vigorous growth and the high number of seed capsules. Of the American tobaccos the Virginia varieties gave less seed and ripened more slowly than Kentucky.

600. BURCEV, JU. A.

(**The methods of cultivating tobaccos for cigar making**).

Sovetskaja Agronomija (Soviet Agronomy) 1950 : No. 12 : 52-63. [Russian].

Breeding tobacco yielding good quality cigar leaf when grown in the shade at the USSR Institute of Tobacco was begun at the Starodubskaja Research Station, Brjansk province, in 1936, and was resumed in 1945 at the Ukrainian Branch Station of the Institute in the Černigov province. Several promising varieties were obtained by crossing the imported varieties, Sumatra Deli and Havana, with the local varieties Devickii and Gundi. They are Arktika [Arctic], from Sumatra Deli x Devickii 468/87, Severjanka 2873 [Northerner 2873] from Sumatra Deli x Devickii, Havana 1112, a hybrid which resulted from free cross pollination of Havana with the local varieties and Hybrid 712, from Arktika x Havana 1112.

601. RENSKIĬ, K. D.

(**Some research at the Lohvickaja Experimental Station**).

Agrobiologija (Agrobiology) 1951 : No. 1 : 180-83. [Russian].

Breeding *Nicotiana rustica* for quality, associated with yellow leaf colour, and for the high

yielding capacity of the green leaved varieties is reported. The crosses included 2/47 (Vysokoroslaja Zelenaja [Tall Green] x Želtaja Teksana [Yellow Texas], 5/47 (Vysokoroslaja Zelenaja 317 x Želtaja 106 [Yellow 106], 10/47 (Vysokoroslaja Zelenaja 317 x Soljanoe 915 [Salt 915]), 35/47 (LU-1 x Želtaja 106), 13/4 (Rudovka x Geljbina) and 34/47 (Pomorskaja [Pomorje] x Želtaja 106).

The percentages of plants with yellow leaves in the progenies were increased when the material was trained upon soils dressed with phosphates and copper sulphate. Lime dressings also had the effect of increasing the proportion of plants with yellow leaves. Copper sulphate dressings improved the productivity and resistance to scorching of some of the plants. Cross 34/47 gave a high percentage of plants with yellow leaves in the  $F_1$ .

602. DONADONI, M.

La ricerca scientifica e la sperimentazione nella tabacchicoltura italiana. (Scientific research and experimentation in Italian tobacco culture). Tabac, Rome 1950 : 7 : Nos. 1-4 : 78-94.

The first part of this review deals with the introduction of tobacco into Italy; the development of the industry; the types of tobacco raised; and the diverse botanical classifications put forward by Italian systematists such as Comes, Splendore, Savelli and Anastasia, and more recently by Kostoff, Goodspeed and East among others, who attacked the problem from the cytological as well as the morphological aspect.

The second part of the paper deals with the establishment of the Scafati research institute and its contributions, in collaboration with other Italian research bodies, to the study of tobacco production from many aspects, including genetics and breeding.

603. FULTON, R. W.

**Superinfection by strains of tobacco mosaic virus.**

Phytopathology 1951 : 41 : 579-92.

At the Wisconsin Agricultural Experiment Station, leaves of *Nicotiana sylvestris* showing tobacco mosaic symptoms caused by any one of 18 strains of mosaic virus developed necrotic lesions when inoculated with each of six necrotic strains. Superinfection occurred readily in dark green tissue having a low mosaic virus population; no lesions were produced in half leaves already possessing a high mosaic virus content. Two of the six necrotic strains,

designated C and H, produced more lesions on mosaic infected leaves of *N. sylvestris* than the remaining four. On mosaic infected *N. plumbaginifolia*, strain C showed a much reduced superinfective capacity and strain H was very weakly pathogenic. When inoculated to healthy leaves of both *Nicotiana* species, low populations of strains C and H rapidly caused complete necrosis whereas strains D, E, F and G multiplied much more extensively before necrosis occurred.

604. STOVER, R. H.

**Tobacco etch virus in Ontario.**

Canad. J. Bot. 1951 : 29 : 235-45.

Three strains of tobacco etch virus prevalent in Ontario have produced etching, necrotic or vein clearing symptoms on tobacco and other hosts. Simultaneous infection with a ring spot strain of potato virus X, obtained from naturally infected tobacco, caused much more severe stunting and chlorosis on burley tobacco than either virus alone.

Additional studies concerning the inheritance of reaction to the etch virus are under way. So far, the  $F_1$  generations of crosses between varieties showing mild and severe symptoms have been only mildly affected, while the  $F_2$  generations have segregated into both mild and severe groups.

605. WEBER, P. V. V.

**Inheritance of a necrotic-lesion reaction to a mild strain of tobacco mosaic virus.**

Phytopathology 1951 : 41 : 593-609.

Data are presented concerning the reactions of the progeny of intervarietal and interspecific crosses of *Nicotiana* to a mild strain of tobacco mosaic virus at Wisconsin University. The necrotic local lesion reaction of *N. sylvestris*, Clayton's TL 106 (*N. Tabacum* x *N. longifolia*), Daruma and several other varieties of *N. Tabacum* was incompletely dominant in the  $F_1$  over the systemic mottling reaction, which generally occurs in a few *N. Tabacum* varieties such as Havana Seed. Observations in the  $F_2$  and  $F_3$  showed that a single gene pair determines the necrotic reaction. In a cross with *N. alata*, the necrotic local lesion reaction of *N. longiflora* to the mild strain was similar to that of *N. sylvestris*. The gene pair concerned has been designated  $n^n s$ . Results of a cross between Daruma, carrying the genes  $n^n s$ , and Holmes Samsoun, bearing  $NN$  genes derived from *N. glutinosa*, indicate that  $NN$  are dominant alleles of  $n^n s$ . It is assumed that reaction to tobacco mosaic virus is determined by at least



*NN*, *n<sup>sn</sup>* and *nn* in a multiple allelomorphic series.

606. HASLAM, R. J.  
**Improvement of tobacco varieties by breeding and selection.**  
 Lighter, Ottawa 1951 : 21 : No. 3 : 11-17.  
 (Mimeographed).

A general view of progress made in the development of tobaccos suited to Canadian conditions indicates that major changes in the choice of varieties have taken place since 1930. The flue-cured types harvested by the stalk cut method were entirely replaced by priming varieties giving higher yields; Harrow Velvet has become the leading burley tobacco and a general improvement in dark varieties has taken place. Many burley and flue-cured tobaccos resistant to black root rot are widely grown, but resistance to virus diseases is still being sought. The breeding programme also includes hybridization and selection to improve the stalks of burley tobaccos and thus facilitate curing.

607. CORBETT, G.  
**Annual Report of the Tobacco Officer of the Department of Agriculture, Cyprus for 1950 : Appendix VI : Pp. 11.** (Mimeographed).

Burley tobacco varieties have given promising results; larger scale trials are to be carried out. The nicotine content of samples of *Nicotiana rustica* varieties was too low from the commercial point of view. Further selections of yellow leaf varieties were made.

608. BAHTADZE, K. E.  
**(Some questions on the biology of the tea plant).**  
 Agrobiologija (Agrobiology) 1951 : No. 1 : 7-21. [Russian].

The biology of *Thea* was studied at the USSR Scientific Research Institute for Tea and Subtropical Plants, Čakva, Georgia. The results include Mičurinite observations on clonal selection, vegetative and sexual propagation, multiparental hybridization, environmental influence and competition between individual plants.

609.  
**Annual Report of the Tea Research Institute of Ceylon for the year 1949 (1951) : Bull. No. 31 : Pp. 55.**

Progress has been made in the development of

high yielding clones with resistance to blister blight (*Exobasidium vexans*).

An analysis of the root system has revealed three types of growth, each characteristic of certain clones, namely vertical, horizontal and intermediate types. Those with horizontal roots are least desirable as they readily succumb to drought.

610. RAMANATHAN, V.,  
 BALL, D. V. and  
 THOMAS, K. M.  
**A review of the past experimental work on coffee in South India with suggestions for the future.**  
 Coffee Res. Sta., Balehonnur 1950 : Pp. 56 + 11.

Breeding has been in progress at Balehonnur since 1927, with the aim of developing strains with resistance to leaf disease (*Hemileia vastatrix*), high yielding ability and improved bean size. Attention has been concentrated on *Coffea arabica* and *C. robusta*. Work has consisted of single plant selection, intervarietal and interspecific hybridization, and trials of species and varieties.

Four physiological races of *H. vastatrix* were identified, only two of which were considered to be of practical importance. Many cultures from single plant selections of *C. arabica* have exhibited resistance to the two common races, I and II, and also to III; all cultures have proved susceptible to race IV.

Seed of four cultures of *C. arabica* which possess satisfactory leaf disease resistance and yielding capacity has been distributed. Among cultures of *C. robusta*, No. 274 is considered promising. Selected plants of *C. robusta* have been cross-pollinated in the hope of obtaining a heterotic effect.

Intervarietal hybridization of *C. arabica* has been carried out between parents resistant to *Hemileia* giving fairly good yields of beans with the desired size. Seed of 333 ( $F_1$  of S 31 x S 22), 645 ( $F_2$  of 333) and 795 ( $F_2$  of 288 x Kent) has been distributed.

Interspecific hybrids and back crosses effected are listed; the material is too young for any conclusions to be reached on its value.

High yielding selections have been obtained from a plant resembling *C. robusta*, discovered on the Margolly estate; these are being multiplied vegetatively. Selections from this tree are known as the Devamachi hybrids. Some of them have been crossed with *C. robusta* and Kent (*C. arabica*), and among themselves.

Experiments on vegetative propagation and pruning are also reported. Future aims of breeding are considered. Increased yield is recommended as the primary objective. The production of hybrid seed and vegetative propagation of outstanding plants are advocated, since these methods do not require so many years as the production of pure strains.

611. **Planters' and Research Workers' Conference, Chikmagalur.**  
Indian Coffee 1951 : 15 : 78-84, 85.

An account is given of the first conference of coffee planters and research workers which was held in April 1951, at Chikmagalur, Mysore. S. N. Ramanna referred to breeding in southern India (cf. Abst. 610); T. S. Venkataraman compared the problems of coffee breeding with those of sugar cane improvement.

612. KRUG, C. A.,  
MENDES, J. E. T.,  
CARVALHO, A. and  
MENDES, A. J. T.  
**Uma nova forma de *Coffea*. (A new form of *Coffea*).**  
Bragantia, São Paulo 1950 : 10 : 11-25.

Although inferior in quality, Excelsa coffee (*C. Dewevrei* var. *excelsa*) is extremely vigorous in growth, even in relatively poor soils. Being diploid ( $2n = 22$ ) it is sterile in crosses with *C. arabica* ( $2n = 44$ ). A plant, thought to be a natural hybrid between these two species, however, and designated 387, is here described. It is almost completely self sterile but its chromosome number proved to be the same as *C. arabica*,  $2n = 44$ . Tetraploids were produced from Excelsa coffee but none of them resembled 387, which, moreover, at meiosis formed univalents and trivalents as well as bivalents and appears indeed to be a hybrid. It crosses with *C. arabica* but less successfully with the diploid species and their autotetraploids. The hybrids with *C. arabica* have been back-crossed with *C. arabica* and in this way one plant which set 69% of seed on selfing was obtained. The crosses made it possible to provide certain data concerning the genetical constitution of 387; although in vegetative features it resembles Excelsa, the beans it produces are incomparably superior and are included in the *C. arabica* class.

613. MEDINA, D. M.  
Observações citológicas em *Coffea*. XIV. Microsporogênese em *Coffea arabica* L. var. *rugosa* K.M.C. (**Cytological observations in *Coffea*. XIV. Microsporogenesis in *C. arabica* L. var. *rugosa* K.M.C.**)

Bragantia, São Paulo 1950 : 10 : 61-66.

The rugose type in coffee produces very few fruits but a cytological study of it revealed no departures from the normal behaviour of the 22 haploid chromosomes sufficient to explain its lack of productivity.

614. MENDES, A. J. T.  
Observações citológicas em *Coffea*. XV. Microsporogênese em *Coffea arabica* L. (**Cytological observations in *Coffea*. XV. Microsporogenesis in *C. arabica* L.**)

Bragantia, São Paulo 1950 : 10 : 79-87.

The course of microsporogenesis is described in flowers taken from vars. *semperflorens* and *Caturra* of *C. arabica*. Out of 39 cells examined in the former variety, 36 had 22 regular bivalents, 2 had 21 bivalents and one had only 17 bivalents, without any univalents. The majority of chromosomes in both varieties had one or two chiasmata. In about 9% of the nuclei resulting from anaphase I, chromosome numbers differing from 22 were observed. Tetrad formation was normal in all but 2 out of 300 cases examined.

615. MENDES, C. H. T.  
Observações citológicas em *Coffea*. XVI. Microsporogênese em *Coffea canephora* Pierre ex Froehner. (**Cytological observations in *Coffea*. XVI. Microsporogenesis in *C. canephora* Pierre ex Froehner**).

Bragantia, São Paulo 1950 : 10 : 97-104.

This species, referred to as Robusta coffee, is self sterile. In the majority of pollen mother cells examined there were 11 bivalents which behaved regularly; very occasionally at anaphase I 12 chromosomes went to one pole and 10 to the other. The majority of bivalents had 1 chiasma, some had 2, 3 and very rarely up to 4. Pollen formation was almost completely normal.

616. MENDES, C. H. T.  
Observações citológicas em *Coffea*. XVII. O saco embrionário em *Coffea canephora* Pierre ex Froehner. (**Cytological observations in *Coffea*. XVII. The embryo sac in *C. canephora* Pierre ex Froehner**).

Bragantia, São Paulo 1950 : 10 : 105-111.

Observations on embryo sac formation in



Robusta coffee showed it to be normal and similar to that in *C. arabica*, except that completion of embryo sac development tended to be just after rather than just before the opening of the flower. Macrosporogenesis can thus not be a factor in the self sterility of the species.

617. GARDNER, V. R.

Variaciones de rendimiento en una plantación de café procedente de semillas. (**Yield variations in a plantation of coffee arising from seed**).

Agricultura Trop., Bogotá 1950 : 6 : No. 9 : 7-11.

The yields of a set of 810 seedlings, mostly of *Coffea arabica*, were compared. The average yield was roughly 5000 grm. per tree, but about 60% of the trees gave less than this and some 33% gave less than 3000 grm., showing that some of the trees were exceptionally high yielders. In fact, there were 12 trees which gave an average of over 10,000 grm. of berries per year over a five-year period. These trees will be used for clone production. The figures showed that the highest yields were not always obtained from the largest trees, so that improvement in yield could be attained without increase in the size of the trees.

618.

**Third Conference, 1950, of the Inter-American Technical Cacao Committee.**

Cacao, Turrialba 1950 : 2 : Nos. 11-12 : Pp. 15.

The subjects discussed included methods of cacao selection, propagation, rehabilitation and establishment of plantations in various countries. Interest was shown in the Cacao Research Scheme for the British West Indies, particularly the work already achieved in Trinidad (cf. Abst. 621).

619. DODDS, K. S. and  
COPE, F. W.

**Field experiments with clonal cacao.**  
J. Hort. Sci. 1951 : 26 : 249-60.

Analyses are presented of accumulated data on six crops obtained from three sets of clonal trials at River Estate, Trinidad, BWI. Consistently high yields have been produced by ICS 1, 6, 8, 16, 45, 60 and 98. Cuttings from good clones have proved superior to buddings on unselected rootstocks, indicating that high yielding clones have more efficient root systems than other clones; a poor yielding clone, ICS

2, was considerably improved by budding on to rootstocks of good quality. Of the seven high yielding clones, all except ICS 16 and 60 are self fertile, while the majority of clones giving poor yields proved to be self sterile. So far it has been impossible to determine whether yields of self sterile clones are lowered by inadequate pollination. The difference between yields of self sterile and self fertile trees is, however, less than that between good and poor clones in the three trials, thus suggesting that low yields in poor clones are dependent on genetic factors.

620. CIFERRI, R.

**Hollow heart of cacao beans.**

Phytopathology 1951 : 41 : p. 656.

In Venezuela, susceptibility of Criollo cacao to hollow heart, the cause of which is as yet unknown, is transmitted to hybrid progeny. The severity of hollow heart symptoms indicates the proportion of Criollo stock involved in the parentage of each strain of Venezuelan Forastero (cf. *Plant Breeding Abstracts*, Vol. XIX, Abst. 2752).

621. BAKER, R. E. D.

**West Indian Cacao research—a progress report.**

Trop. Agriculture, Trin. 1950 : 27 : 227-30.

A brief review is given of the progress of cacao research in Trinidad since 1930. Apart from breeding for high yields of good quality, attempts have been made to produce varieties resistant to witches' broom (*Marasmius pernicius*), thrips and a cacao virus which resembles a mild strain of the West African swollen shoot virus. Clones recommended for general distribution include ICS 1, 6, 8, 39, 40, 45, 60 and 95. Further research is in progress and a collecting expedition to western Venezuela for additional wild *Theobroma* species is being considered.

622.

**Annual Report of the Department of Hop Research, Wye College 1950 :**  
Pp. 84.

*General report.* (pp. 4-20).

Selection of commercial varieties and of promising seedlings resulting from open and controlled pollination continued. Crosses of Fuggle and other female hops with *Verticillium* wilt resistant male hops have been effected.

The value of established varieties and new male and female seedlings as parents in breeding is

being determined by progeny testing; at present resistance to *Verticillium* wilt and preservative value are being used as criteria. Male plants are being classified by the number of resin glands produced on the anthers to ascertain whether this measurement indicates their behaviour in influencing resin production of the female progeny. Methods of preventing pollen contamination in hybridization have been investigated. The most promising appears to be use of a pressurized chamber fed with filtered air. Storage of pollen in slightly humid air in a refrigerator is satisfactory.

Tetraploid-diploid chimeras have been induced in Fuggle and three other varieties by treating young buds with colchicine; propagation of pure tetraploid stocks from these plants is being attempted. By crossing tetraploid females with diploid males possessing disease resistance and other desirable characters, it is hoped to obtain valuable triploids; possibly triploids may produce suitable seedless hops.

Plants raised from seed which was received from Japan as *Humulus Lupulus* var. *cordifolius* are hybrids; so far this material has shown no new characters likely to be valuable in breeding; the difference of a single factor apparently conditions red or green colour of the bine.

Progress has been achieved in developing a homozygous golden-leaved male for use as a tester stock in genetical and pollination studies. Experiments on the fertility of the cones of different varieties continued.

No significant correlation has been discovered between number of leaf glands and amount of resin developed in the cones; leaf counts cannot therefore be used as a basis of selecting for high preservative value. It may, however, be possible to establish a threshold value for leaf gland count as a criterion for eliminating first year seedlings which are potentially poor resin producers.

The following technique is useful in obtaining suitable material for squash preparations of root tips. The potted plant is kept in the refrigerator just a little above freezing point for 4 days, so that all cell divisions in the roots are stopped. Removal of the plant to warm growing conditions for 2 days results in the simultaneous division of a large number of cells.

Ordinary bivalent pairing has been observed in pollen mother cell divisions of Italian wild hops, Canadian wild hops and *H. Lupulus* var. *neomexicanus*. No evidence of an unequal pair of sex chromosomes has been secured. A chain of four chromosomes has been detected in pollen mother cell division of male seedlings raised from

seed of the so-called wild hop of Japan; a similar observation has been made by Japanese investigators.

Burgess, A. H. and Tatchell, A. R. Progress report on studies of deterioration of hops during storage. (pp. 21-46).

Rate of deterioration of humulone during storage is a varietal characteristic. From an analysis of Brewer's Gold and Northern Brewer, which show rapid and slow deterioration, respectively, difference in rate of deterioration did not appear to be associated with difference in type of humulone. Investigations were carried out to study the effects of storage conditions upon rate of deterioration, and also the causes of deterioration of pure humulone. In general, cold storage reduces the rate of deterioration but does not mask the effect of variety. Storage in oxygen accelerates deterioration and eliminates varietal differences.

Dark, S. O. S. A survey of the present position in hop genetics. (pp. 58-67).

Literature on hop genetics is critically examined.

Salmon, E. S. The challenge cups for new varieties of hops. (pp. 68-71).

The results of the 1950 competition among growers are presented.

## 623. HOP INDUSTRY

**The hop industry. Report of a visit to the USA and Canada in 1950 of a productivity team representing the hop industry.**

Anglo-American Council. Productivity, London and New York 1950 : Pp. 113.

The report of a tour of hop growing districts in the western United States and western Canada, made by the Hop Industry Productivity Team from England and sponsored by the Anglo-American Council on Productivity, is presented. Reference is made to hop varieties, and also to research in progress, including breeding.

## 624. LIMBERK, J.

Pokusy s roubováním dřevnatých rostlin na rostliny nedřevnaté. I. Roubování chmele na konopí. (Experiments with grafting woody plants on nonwoody plants. I. Grafting hop on hemp).  
Sborn. Českosl. Akad. Zeměd. 1950 : 24 : 11-17.

Hop seedlings grafted on hemp stocks developed into plants showing no morphological differences



from hops grown on their own roots and produced cones in the year the graft was made. In the autumn, the scions lignified and differentiated dormant buds.

Some seed obtained from pollination of the grafted hop seedlings with hemp is being studied.

625. BLATTNÝ, C.,  
OSVALD, V. and  
ANTIPOVIČ, D.  
Důležitost popisu vývoje chmelných  
hlávek pro šlechtitele chmele. (**The  
importance of descriptions of the  
development of hop cones to the hop  
breeder**).  
Sborn. Českosl. Akad. Zeměd. 1950 : 24 :  
101-08.

Knowledge of the morphology and morphogenesis of hop cones is regarded as indispensable to the breeder. Analyses of wild hops suggest that many botanical forms exist. These are regarded as ecological modifications. The progenies from all crosses differ from their parental forms, even when the female parent is an ancient variety which has been previously reproduced vegetatively. The effect of the male variety upon the inheritance of the hybrids is most apparent in respect of aroma.

Several male wild hop seedlings were changed experimentally into female plants. This was done by pruning the branches bearing inflorescences immediately before flowering. An important breeding aim is to obtain male plants from the ancient cultivated female varieties. Wild hops include some promising forms producing two leafless cones and forms with three cones.

626. SIMOENS, U.  
Le Centre d'Essai Houblonnier à Poperinge en 1950. (**The Hop Experimental Centre at Poperinge in 1950**).  
Rev. Agric., Bruxelles 1951 : 4 : 682-87.

Past and current work of the Poperinge Experiment station is briefly described with tables showing (a) the performance of selections of Hallertau, Tettnang and Fuggle; (b) analyses of quality in new plantations; and (c) the quality of Tettnang, Brewer's Gold and Bullion as indicated by brewing tests.

Brewer's Gold, Malling Mid-season, Bullion Hop, OM26 and Précoce de Bourgogne [Early Burgundy] show notable quality as regards resins, but their yield has still to be tested.

## MINOR CROP PLANTS

627. DE ZERPA, D. M.  
Los cromosomas de *Schoenocaulon officinale* (Cebadilla). (**The chromosomes of *S. officinale***).  
Agron. Trop., Venezuela 1951 : 1 : 83-84.

The number  $2n = 16$  was established in pollen mother cells, meiosis being normal.

628. PORTÈRES, R.  
Le problème des migrations végétales transpacifiques d'Asie en Amérique à l'époque Tertiaire et la distribution des espèces de vanilliers. (**The problem of transpacific plant migrations from Asia to America in the tertiary era and the distribution of the species of vanillas**).  
Rev. Bot. Appl. 1951 : 31 : 290-94.

In the absence of any conclusive evidence to explain the occurrence of various species of *Vanilla* on the American continent, the writer regards transpacific migration from the Indo-malayan centre as the only theory that could explain the problem in the light of present knowledge.

629. PORTÈRES, R.  
Nouvelles espèces de vanilliers. (**New species of vanillas**).  
Bull. Soc. Bot. Fr. 1951 : 98 : 92-95, 126-27.

*Vanilla Tisserantii*, *V. Leprieurii* and *V. Pleei* are the new species described.

630. SMITH, P. G.  
**Deciduous character of pepper.**  
Calif. Agric. 1951 : 5 : No. 6 : p. 12.

In Chili Piquin and three other wild small-fruited forms of *Capsicum annum* the ripe fruit is readily separated from the calyx. This economically valuable character depends upon a single dominant gene. Segregates of crosses and back crosses involving Chili Piquin and nondeciduous varieties differ in the degree of tightness with which the fruit is attached to the receptacle; fruits requiring a certain amount of pull are the most desirable commercially. Limited data indicate that the deciduous character is dominant in several other species of *Capsicum*; but since these species are difficult to cross with cultivated pepper, Chili Piquin and other wild forms of *C. annum* are the best source of the gene for deciduous fruit.

631. NOURISSON, A.  
Les crus de moutarde. (**The types of mustard**).  
Travaux Effectués en 1949 par les Stations Agronomiques. Inst. Nat. Rech. Agron., Paris 1950 : 123-26.

The chemical composition of different types of mustard seed supplied to French manufacturers is discussed with remarks on the existing confusion in nomenclature. The growing tendency to describe seed of *Brassica juncea* as black mustard is deplored since in fact it should be termed brown.

The different kinds of seed should be clearly classified, and definite types established and subjected to selection and hybridization to obtain a race adapted to French soils and rich in the essential oils required by the mustard manufacturer and pharmaceutical chemist.

632. VERVELDE, G. J.  
Een eenvoudige en goedkope wijze van vetbepaling in oliehoudende proefveldzaadmonsters. (**A simple and cheap method of estimating the fat content of oil-bearing seed samples from field experiments**).  
Landbouwk. Tijdschr. Wageningen 1951 : 63 : 456-58.

For the breeder of oil crops it is more important that field experiments should provide exact information on the actual differences in fat content than that the absolute fat content of each individual sample should be ascertained. To meet this requirement a method of analysis is described in which the loss of weight after extraction of ground air-dry seed samples was taken as an estimate of the fat content.

633. FROLOV, P. V.  
(**Improve the breeding and seed growing work with oil plants in the Ukraine**).  
Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 12 : 15-21. [Russian].

Various Ukrainian institutes engaged in breeding and seed growing work with oil plants are criticized for producing only a few satisfactory new varieties and for a slow release of material. Of the 21 varieties of oil plants, which were made standards in the Ukraine in 1950, only the sesame variety Odesskii 539 [Odessa 539], two soya bean varieties, Harjkovskaja 149 [Harjkov 149] and Dnepropetrovskii 1 [Dnepropetrovsk

1], and a *Perilla* variety Ukrainskaja 30 [Ukrainian 30], the latter remarkable for its productiveness and earliness, have been developed in the Ukraine.

The most recently developed Ukrainian varieties of rape, most of which are still under trial, are listed. They include the winter rapes Vinnickii Mestnyi [Local Vinnica] and Moldavskii 2 [Moldavian 2], the former developed in the Vinnica and the latter in the Žitomir province, and the spring rapes Nosovskii 9, developed at the Nosovskaja State Breeding Station, Vysokopoljskii 12, bred at the Vysokopoljskii Varietal Field, and Koblevskii, produced for drought resistance and earliness in the Nikolaevska province.

Two local winter rape varieties, Podoljskii Mestnyi [Local Podol] and the small seeded Černjahovskii Mestnyi [Local Černjahovskii], have been improved.

Breeding work with *Camelina*, mustard, *Perilla*, linseed and other oil plants is in progress.

Reference is made to a new linseed variety Hybrid 13, bred at the Vysokopoljskii Varietal Field.

634. ŽDANOV, L. A.  
(**The problem of increasing the yield and oil content of mustard (*Brassica juncea* L.) Czern.**)  
Doklady Vsesojuz. Akad. Sel'sk. Nauk im. V.I. Lenina (Proc. Lenin Acad. Agric. Sci. USSR) 1951 : No. 1 : 3-9. [Russian].

Mičurinite breeding of mustard for high yielding capacity and high oil content at the Experimental Base of the Don Research Breeding Station is reported. Intravarietal hybridization of Želtosemjannaja 2 [Yellow Seed 2] and intervarietal cross pollination between Želtosemjannaja 2 and Želtosemjannaja iz Stavropolja [Stavropolj Yellow Seed] has given material superior to the standard Stalingradskaja 189/191. Breeding for high oil content is in progress. The methods consist of selection for yellow seed, which has a higher oil extraction rate than blue seed, and of training for the winter habit.

635. KURITA, M.  
(**Secondary association of chromosomes in the castor oil plant**).  
Jap. J. Genet. 1946 : 21 : p. 63. [Japanese].

Secondary association between two pairs of bivalents has been noted in metaphase plates of *Ricinus communis*.



636. MAZZANI, B.  
 Datos descriptivos de nuevas líneas de ajonjolí (*Sesamum indicum*) y resultados de un ensayo de rendimiento en Acarigua. [Descriptive data on new lines of sesame (*S. indicum*) and results of a yield test at Acarigua].  
 Agron. Trop. Venezuela 1951 : 1 : 51-66.  
 Tests with 20 lines, including a number of hybrids and selections, using Venezuela 52 as a control, showed hybrids 48-2823 and 48-2818 to be the highest yielders, whilst the hybrids Venezuela 51 and 52 were both inferior to the local commercial strain, and Venezuela 52 proved very mixed.
637. SEARS, R. D. and WINGARD, S. A.  
**Fusarium wilt of sesame at Charlotte Court House, Virginia, in 1950.**  
 Plant Dis. Reporter 1951 : 35 : p. 173. (Mimeographed).  
 A report of the percentage infection observed on 25 varieties shows that Early Russian and the Nebraska varieties 406-61-3-12, 119-3, 2143 and 2346 were resistant.
638. FROLOV, P.  
**(The progress of linseed cultivation in the eastern districts).**  
 Socialističeskoe Seljskoe Hozjaistvo (Socialistic Agriculture) 1951 : No. 9 : 48-55. [Russian].  
 The dual purpose varieties Sibirjak [Siberian] bred at the Barnaul State Breeding Station, Siberia, Voronežskii 1308 [Voronež 1308], VIR\* 1650 and VNIIMK† 5237 gave a good account of themselves in trials conducted in Siberia, the Urals and the northern and eastern provinces of Kazakhstan.
639. FRÖIER, K.  
 Sortfrågans betydelse vid odling av oljelin. (The importance of the variety question in the cultivation of linseed).  
 Allmänna Svenska Utsädesaktiebolaget (General Swedish Seed Co.) Svalöf 1951 : 46-49.  
 A brief review of various recently bred linseed varieties from Sweden, Denmark and Finland shows that the existing varieties have been obtained by natural selection, line selection or mass selection. Pedigree selection too has been used to produce the Svalöf line selection Sv
- 01052 derived from Svalöfs renodlade oljelin [Svalöf Pure-bred linseed] which it exceeds in yield, oil content and uniformity of growth.  
 Now extensive hybrid material from combinations between Valuta and some foreign high yielding lines is being tested and it is hoped that crossing combined with selection will be as successful (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 139).
640. WEBSTER, C. C.  
**The improvement of yield in the tung oil tree (*Aleurites montana*).**  
 Trop. Agriculture, Trin. 1950 : 27 : 179-220.  
 A detailed account is given of investigations, carried out at the Tung Experiment Station, Zomba, Nyasaland, and in the neighbouring Cholo district, concerning variations in commercially grown *A. montana*. Seasonal variation occurs in the proportion of male and female flowers borne on individual trees but no changes from a predominantly male to a fruit producing type or *vice versa* have been observed. Two growth forms are common; the A type has a main trunk of indefinite growth while type B produces a short primary axis and subsequent bushy habit. Growth form, vigour and yielding capacity are generally reproduced in buddings taken from both A and B types. Precocious fruiting is characteristic of young B clones but it is thought that the fruit crops from A clones will increase until they outyield most of the B clones. At present, mixtures of both clones from selected trees are recommended.  
 No significant correlations were observed between the seed yield and fruit characters. When scions of the same clones were grown on *A. montana* and *A. Fordii* rootstocks no significant differences were found except in mean seed weight. Variations in fruit characters are much less than variations in oil yield, and selections of high yielding mother trees for vegetative propagation is of greatest importance.  
 Data from experiments suggest that the amount of cross pollination is adequate in plantations containing 5% of predominantly male clones, particularly if the latter blossom early and have an extensive period of pollen production. Selection for desirable pollinating clones is continuing.  
 A comparison of progenies from open-pollinated mother trees, legitimate families produced by controlled selfing or crossing, hybrids between

\* Vsesojuznyi Institut Rastenievodstva [USSR Institute of Plant Industry].

† Vsesojuznyi Naučno-Issledovatel'skii Institut Masličnyh Kul'tur [USSR Scientific Research Institute of Oil Crops].

*A. montana* and *A. Fordii*, and clones propagated vegetatively from selected trees is in progress.

641. HEISER, C. B. (Jun.)  
**Hybridization in the annual sunflowers: *Helianthus annuus* x *H. debilis* var. *cucumerifolius*.**

Evolution, Lancaster, Pa 1951 : 5:42-51.

In eastern Texas, *H. annuus* approaches *H. debilis* var. *cucumerifolius* in a number of characters. Data on artificial and natural hybrids between the two species have led to the conclusion that hybridization followed by introgression is the most likely explanation of the variation of *H. annuus* in the direction of *H. debilis* var. *cucumerifolius*, although the occurrence of parallel gene mutations cannot be entirely ruled out. Some discontinuity between the two species has been preserved as a result of preferences for different habitats, the high degree of sterility of the interspecific hybrids and a slight difference in the time of flowering.

642. ČERNOMAZ, P. A.  
**(The effects of the size of seed and supplementary fertilization upon the yield of the sunflower).**

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 12 : 72-73. [Russian].

In experiments with Černjanka 35, appreciable yield increases were obtained by planting seed selected for large size. Supplementary fertilization, especially when repeated, increased yields further.

643. KALTON, R. R.  
**Efficiency of various bagging materials for effecting self-fertilization of sunflowers.**

Agron. J. 1951 : 43 : 328-31.

Experiments were carried out at the Hoblitzelle Agricultural Laboratory, Renner, Texas, to compare three types of cloth and two types of paper bags for their efficiency in the self-pollination of two strains, S 37-388, an inbred line of Mennonite, and Sunrise, a selection of a Russian introduction. Irrespective of type of bag, S 37-388 was lower in self fertility than Sunrise. Bags of 88 and 128 thread muslin gave the most satisfactory results. Germination percentage was not appreciably affected by selfing. Non-bagged heads of S 37-388 and Sunrise were cross-pollinated to the extent of 61.5 and 16.6% respectively. The application of these results to the development of inbreds for hybrid production under Texan conditions is discussed.

644. CHANDLER, C.  
**Flowering habits and fertility of some *Cinchona* species in Guatemala.**

Contr. Boyce Thompson Inst. 1951 : 16 : 249-59.

In the course of interspecific and intraspecific crossing with *C. Ledgeriana*, *C. Calisaya* and *C. succirubra* the pollination of the heterostylous flowers of all three species was studied. Short-styled flower buds of *C. succirubra* rarely opened and most buds on long-styled trees also remained closed although the stigma were receptive within the corollas. Self sterility was characteristic of the three species and cross pollination between two short-styled or two-long styled flowers failed to produce seeds. The legitimate crosses between heterostylous flowers were, however, generally successful and further observations will be made concerning the quinine content, vigour and disease resistance of these progenies compared with known *Cinchona* clones. Colchicine-induced polyploids are also under observation. It is possible that they may have a higher alkaloid content than diploids. Among certain *C. succirubra* progenies, several green and white variegated seedlings were found; these appear to be sectorial chimeras.

645. RIVALS, P.  
**La question du quinquina à la Réunion. (The question of cinchona in Réunion).**

Rev. Agric. Réunion 1950 : 50 : 141-48, 207-15, 255-70; 1951 : 51 : 5-22.

An historical review dealing with the introduction, distribution and development of cultivation of cinchona in the island, is followed by comments on the alkaloid content, and in particular the quinine content, recorded for the various species of *Cinchona* in experiments by various investigators.

The last section of the paper refers to the remains of former collections in the island and to the possibility of establishing successful plantations there.

646. SZKOLNIK, M.  
***Phytophthora parasitica* diseases of cinchona in Central American field plantings.**

Plant Dis. Reporter 1951 : 35 : 16-24. (Mimeographed).

Investigations made at Finca El Naranjo, Guatemala, indicate that clones of *Cinchona* show marked differences in susceptibility to *Ph. parasitica*, which causes both top blight and girdle canker. *C. Ledgeriana* and closely related



hybrids are very susceptible. *C. succirubra* is tolerant of infection but its bark yields a low percentage of quinine; thus although several hybrids of *C. succirubra* parentage show considerable tolerance of *Ph. parasitica* they are not commercially valuable except as rootstocks. Clone ZM (*C. Ledgeriana* x *C. succirubra*) shows a degree of susceptibility intermediate between that of the parent species.

647. VAN HELL, W. F.  
Verslag over het Algemeen Proefstation der A.V.R.O.S. over de jaren 1941-1947 en over het jaar 1948. (**Reports of AVROS during the years 1941-47 and the year 1948**).  
Meded. Alg. Proefst. AVROS 1948 : Alg. Ser. No. 62 : Pp. 52.

This report deals with the vicissitudes of the rubber and oil palm plantations and experimental plots and the research buildings during and following the Japanese occupation of Java. Some of the records relating to the plantation work were however saved, and the 1948 report contains information on rubber, oil palm and tea plantations and estates where selection and other work will now be continued.

648. WARMKE, H. E.  
**Studies on pollination of *Hevea brasiliensis* in Puerto Rico.**  
Science 1951 : 113 : 646-48.

Midges belonging to the family Heleidae are the chief pollinating agents, as shown by the positive correlation between the presence of pollen grains and hairs of these insects on the sticky stigmatic surfaces. Thrips appear to be responsible for a certain amount of pollination.

649. TAYLOR, K. W.  
**Guayule—an American source of rubber.**  
Econ. Bot. 1951 : 5 : 255-73.

The possibilities of increasing yields of guayule rubber by interspecific hybridization within the genus *Parthenium* are discussed. During breeding experiments in California, *P. Stramonium* ( $2n = 36$ ), a large tree-like shrub which reproduces sexually, has crossed readily with the low-growing apomictic *P. argentatum*, forming vigorous hybrids. When *P. argentatum* parents with  $2n = 54$  or  $72$  were used, true breeding apomicts were produced; but if the guayule parent had 26 chromosomes the hybrids reproduced sexually and subsequent progenies showed segregation of characters. Desirable apomictic selections from the latter have been obtained; at maturity these should yield 50% more rubber per acre than locally grown strains

of *P. argentatum*. It is hoped that the apomictic hybrids will retain their desirable qualities for many generations. Adaptability trials are in progress throughout California and Texas. Further interspecific hybridization will be undertaken to improve cold tolerance and disease resistance and obtain additional yield increases.

650.

A melhor tipo de borracha até hoje conhecido no Brasil. (**The best type of rubber known up to now in Brazil**).  
Bol. Minist. Agric., Brasil 1946 : 35 : Nos. 7-12 : 77-78.

Investigations of the rubber obtained from a number of Brazilian trees have shown that the rubber from *Sapium* sp. is equal in quality to that of *Hevea brasiliensis*, and that rubber from *H. Benthamiana* is also of first-class quality.

## FRUITS AND NUTS

651.

**The Annual Report of the Agricultural and Horticultural Research Station, Long Ashton, Bristol 1950 :**  
Pp. 217.

### Apple

A simplified method is outlined for controlling pollination of apples by using a smear of vaseline on the stigma instead of enclosing the flower in a paper or muslin bag. Although there was a reduced set from some crosses between Lord Lambourne x Miller's Seedling and Sweet Alford x Dabinett, the advantages of this method of stigma protection are such that further trials will be undertaken.

Changes occurring in the pectin and nitrogen contents of cider apple juices during maceration and defecation have been investigated. Sweet Alford, Bulmer's Norman and Red Foxwhelp clarified rapidly and responded well to treatment. Kingston Black did not clarify satisfactorily.

A comparative assessment of the quality of ciders from the four varieties shows that although the effects of maceration differ with the variety, ciders made from defecated juices are of good quality.

A marked reduction occurs in juice acidity during storage. In Crawley Beauty the decreased acidity was accompanied by a fall in quality; Allington Pippin and Cox's Orange Pippin juices formed undesirable deposits of a pectinous nature after bottling. However, in Bramley's Seedling, a variety with a high acid content, the lowered juice acidity appeared to be beneficial.

## Pear

The comparative merits of preserving processes have been assessed, using three commercially grown varieties. Bottling preserved the flavour and texture better than freezing; Bristol Cross was the most satisfactory variety for bottling.

## Plum

The relative adaptability of 12 varieties to bottling and canning has been assessed with respect to size, colour, texture, flavour and sugar:acid ratio. Apricot Gage, Victoria and Shropshire Prune Damson compared favourably with other varieties.

## Small fruits

The results of tasting tests on many varieties of soft fruits preserved by bottling, canning and deep freezing show that the frozen fruits were generally superior in colour and appearance but frequently inferior in texture or flavour.

Auchincruive Climax strawberry (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 1855) proved excellent for freezing and quite good for bottling and canning.

### 652. NILSSON, F.

Berättelse över verksamheten vid Balsgård år 1946. (**Report on the work at Balsgård, 1946**).

Fören. Växtföräd. Fruktträd 1947 : Pp. 11.

Fruit breeding operations during 1946 have included: (i) hybridization of fruit species to obtain material for selection, over 21,698 apple flowers having been pollinated; (ii) studies of seedlings from triploid varieties of apples; (iii) experimental induction of polyploidy in apples, cherries and hazels by colchicine treatment; (iv) selection of stocks; and (v) X irradiation of grafting material.

The extensive crossing programme carried out included pears and plums, cherries and hazels. A pentaploid apple is recorded from the cross Galloway x tetraploid 38/1 from Belle de Boskoop.

### 653. NILSSON, F.

Berättelse över verksamheten vid Balsgård år 1947. (**Report on the work at Balsgård, 1947**).

Kristianstad 1948 : Pp. 8.

### GRANHALL, I.

Berättelse över verksamheten vid Balsgård år 1948). (**Report on the work at Balsgård, 1948**).

Fören. Växtföräd. Fruktträd 1948 (1949) : Pp. 30.

During 1947 and 1948 the work of the Association for the Breeding of Fruit Trees, Balsgård,

Sweden, was based on the following research programme carried out on pome and stone fruits: extensive crossings; selection for hardiness and disease resistance in hybrid populations from earlier crosses; the production of new polyploids; X irradiation of apples and pears to obtain mutations; and selection among stocks of apples and quinces.

The 1948 report also records the production of (1) a triploid hybrid *Prunus avium* x *P. Cerasus* by the colchicine technique, and (2) crosses between *Corylus maxima* and the putative hybrids Jättenöt från Halle [Halle Giant], Cosford and Nottingham, which are assumed to be derived from the cross *C. Avellana* x *C. maxima*.

### 654. SUMMERVILLE, W. A. T.

**Contributions of agricultural research in crops.—3. Tropical horticulture.**

J. Aust. Inst. Agric. Sci. 1951 : 17 : 80-82.

A brief survey is given of breeding work carried out in Australia during the last 50 years to improve commercial varieties of pawpaw, avocado, banana and pineapple.

### 655. READ, F. M.

**Contributions of agricultural research in crops.—2. Temperate horticulture.**

J. Aust. Inst. Agric. Sci. 1951 : 17 : 77-79.

Although most varieties of fruit have remained comparatively unchanged in Australia throughout the past 50 years, many new rootstocks have been developed and fruit quality has been further improved by careful bud selection.

### 656.

**Fruitgrowers' field day. Scoresby Research Station.**

J. Dep. Agric., Vict. 1951 : 49 : 383-87.

Work in progress at the above station, Victoria, Australia, includes: development of apple and pear seedling rootstocks from controlled and open-pollinated crosses; trials of lemon varieties and rootstocks; and peach breeding and rootstock tests. It is hoped that a commercial pear stock free from black end and root aphid will be produced from oriental types. One of the properties being sought in apple stocks is resistance to woolly aphid.



657. REITBERGER, A.  
Die Chromosomenzahl von Südtiroler Apfelsorten. (**The chromosome number of south Tyrolean apple varieties**).

Z. Pflanzenz. 1951 : 30 : 276-79.

The four apple varieties Kalterer Böhmer, Köstlicher [Delicious], Spitzlederer and Weisses Rosmarin [White Rosemary] are diploids. Cytological sterility is regarded as unlikely.

658.

- Triploida äpplen och randiga päron. (**Triploid apples and striped pears**).  
Tidskr. Lantm. 1951 : 33 : p. 126.

At the Balsgård Institute for Fruit Breeding in southern Sweden, polyploid varieties of apples have been obtained by the use of chemical substances, X rays and radioactive isotopes. A tetraploid apple has been crossed with pear; the hybrid has flowered and should bear fruit this year. A radioactive phosphorus preparation has been used to obtain striped pears. Giant nuts are expected this autumn from a tetraploid giant hazel produced at the institute.

659. SKARD, O. and WEYDAHL, E.  
Asorbinsyre—vitamin C—i äpplsorter. [**Ascorbic acid (vitamin C) in apple varieties**].  
Meld. Norg. LandbrHøisk. 1950 : 30 : 477-515.

Part I of this paper records the vitamin C content of 99 varieties of apples at the Norwegian Agricultural College during 1943-45. In the group of triploid varieties, with the exception of Gravenstein, which averaged 7 mg. per 100 gm., the content ranged between 14.0 mg. and 23.0 mg. per 100 gm. Apples with a good red colour without any green or yellow areas were generally superior in vitamin C content. Part II records the ascorbic acid content in varieties of apples, currants and raspberries grown in various northern latitudes in Norway, with observations also on the effects of temperature, precipitation and the number of hours the sun remains above the horizon upon the ascorbic acid content in apples.

660. OSBORNE, D. J. and WAIN, R. L.  
**Studies on plant growth-regulating substances. III. The production of parthenocarpic pomaceous fruits by chemical treatment.**  
J. Hort. Sci. 1951 : 26 : 317-27.

The capacity of numerous chemicals to induce

parthenocarpic fruit development in several varieties of apple and pear has been investigated at Wye College. An almost complete fruit set was obtained from emasculated blossoms of Pitmaston Duchess, Dr. Jules Guyot and Fertility pears by treatment with  $\alpha$ -(2-naphthoxy)-propionic acid. Mature parthenocarpic fruits could only be induced on one apple variety, Bramley's Seedling, after repeated spraying with  $\alpha$ -phenoxypipronic acid.

661. MAURER, K. J.  
Vorläufiger Bericht über einen Stamm- bzw. Gerüstbildnerversuch. (Zweites Baumschuljahr). (**Preliminary report on an experiment with stem and frame builders. Second year in the nursery**).  
Züchter 1951 : 21 : 115-23.

Continuing a previous preliminary report (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2104), further results are given of the observations and measurements made on stem and frame builders. Twelve varieties of apple trees were studied; the geographical origins of the varieties, their names and synonyms and the genetic origin in the case of hybrids are given. Frame builders from eastern and western Europe are compared. Adverse criticism of the variety Antonovka is refuted. In future, frost hardiness, compatibility with cultivated apple varieties and with the usual stocks and a favourable influence on the scion will be of primary importance in choosing frame builders in Germany; rapid growth and straight stems will be a secondary consideration. The need for a regional study of the problems relating to frame builders is indicated.

662. TIHONOV, N. N.  
(**Laletino, a valuable reinette variety**)  
Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 6 : 71-72. [Russian].

Laletino, bred at the Krasnojarsk Fruit Research Station, proved harder than most Siberian reinettes, except Ranetka Purpurnaja [Purple Reinette]. It is early bearing, productive and shows resistance to scab. The fruits weigh 7.5 gm. They are round, ribbed and bright red, with pink juicy flesh, are sweeter than those of other reinettes, and reach maturity in September when they may be eaten fresh or used for processing. The keeping properties of the fruits are unsatisfactory.

663.

**Fruit breeding horizon includes trees that require no pruning.**

Amer. Fruit Gr. 1951 : 71 : No. 9 : p. 16.

A brief report concerning breeding in Illinois mentions the development of an apple tree which appears to have been pruned according to local practice although it has remained untouched.

664. KIDD, F. and  
WEST, C.

**The storage of late dessert apples.**

J. Minist. Agric. 1951 : 58 : 276-78.

A brief account of an investigation carried out at Ditton during the years 1948-50 concerning storage of 20 British and Continental varieties in air at 37 and 31.5° F. shows that the quality of Barnack Beauty, Belle de Boskoop, D'Arcy Spice, Tydeman's Late Orange, Winston and Glockenapfel was maintained until March or April at 37° F. Barnack Beauty and Belle de Boskoop were liable to degenerate at 31.5° F. although the other four varieties kept equally well at this temperature.

665. VASSIHIN, I. G.

**(The apple variety Čulanovka).**

Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 8 : p. 38. [Russian].

A remarkably hardy variety, Čulanovka [Larder], cultivated in the Novgorod province, is described. It shows resistance to pests and diseases and has good yielding capacity. The fruits are greenish yellow with pink cheeks and white flesh of good flavour. The variety reaches maturity in July.

666. ČERNENKO, S. F.

**(The new apple variety Uspeh).**

Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 7 : 12-14. [Russian].

A description is given of the new variety Uspeh [Success], bred at the Central Genetical Laboratory, Mičurinsk, from Pepin Litovskii [Lithuanian Pippin] x Anis. In the early stages of development the variety was trained for hardiness upon Grušovka Moskovskaja [Moscow Pear].

Uspeh is hardy, productive and early bearing. It shows resistance to diseases and bears attractive fruits which have good keeping properties. The fruits have cherry red cheeks and the shape of Pepin Litovskii and weigh 90 to 120 gm. The skin is thin and smooth and the flesh yellowish white, tender, juicy and of good flavour. The variety reaches maturity in October.

667. Ro, L. M. and

NIKONENKO, M. N.

**(New apple varieties for the Ukrainian SSR).**

Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 7 : 8-12. [Russian].

Several apple varieties bred for quality and hardiness at the Mleev Station, Gorodišče, Kiev province, are described. They were developed by the present writers and P. E. Cehmistrenko. Some of these varieties, such as Avgustovskoe [August], from Landsberger Reinette x Papirova, Renetnoe Mleevskoe [Mleev Reinette], from Landsberger Reinette x Papirova, Zelenka Dneprovskaja [Dnepr Green], from Renet Simirenko [Simirenko's Reinette] x Papirova, Osennée Zolotoe [Autumn Golden], from Winter Golden Pearmain x Kronselskoe Prozračnoe [Croncels Transparent], Slava Pobediteljam [Glory of Victors], from Papirova x MacIntosh, Kaljvilj Mleevskii [Mleev Calville], from Winter Golden Pearmain x Kaljvilj Snežnyi [Snow Calville] and Mleevskaja Krasavica [Mleev Beauty], from Winter Golden Pearmain x MacIntosh, have passed through their trial stages and are being released for extensive cultivation in various Ukrainian provinces.

Descriptions are given of several still unnamed hybrids, which have been made standards in the western districts of the Ukrainian woody steppe.

Hybrid 19632 was bred from Papirova x MacIntosh. The fruit weighs 105 gm. and has yellowish white flesh with pink patches. The flavour is good. The fruit reaches maturity in September and keeps until mid November.

Hybrid 17890 was obtained from London Pippin x MacIntosh. The fruit weighs 102 gm. and has yellowish white soft juicy flesh of good flavour. The fruits reach maturity in October and keep until March.

Hybrid 7797, from London Pippin x Landsberger Reinette, produces fruits weighing 140 gm. They have greenish white soft juicy flesh of good flavour and are ripe in October and keep until May.

Hybrid 1060, from Boiken x MacIntosh, produces fruits weighing 117 gm. and having good flavour. The flesh is yellowish white, firm and juicy. The fruit reaches maturity in October and keeps until June.

Hybrid 20318 was bred from Boiken x Landsberger Reinette. It bears fruits weighing 140 gm. and having good flavour. The flesh is greenish white and firm. The fruit reaches maturity in October and keeps until May.



668. ŽAVORONKOV, P. A.  
(New hardy apple varieties in the Urals).

Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 6 : 11–14. [Russian].

The results of Mičurinite breeding work at the Čeljabinsk Fruit and Vegetable Research Station have been already reviewed (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2109), but the present paper includes descriptions of two large fruited apple seedlings not previously mentioned.

Anis Piramidalniy [Pyramidal Anis], selected from Anis Alyi [Scarlet Anis], is a vigorous tree. The fruits are round, weigh 75 gm. and reach maturity in autumn. The flesh is white, tender and sweeter than that of Anis Alyi. Sejanec Skrižapelja [Skrižapelj Seedling] is a vigorous variety reaching maturity in autumn. The fruits weigh 87 gm., are green with red stripes, round and slightly ribbed. The flesh is greenish, granular, juicy and sweet.

669. NOŽNIKOV, M. I.  
(Some experimental results in fruit growing in the Karaganda province).  
Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 8 : 28–31. [Russian].

**Apple**

Over 200 varieties of apple have been tested and the best hardy varieties selected. Kitaika Zolotaja [Golden Chinese Crab] and Šafran Severnyi [Northern Saffron] proved the only large fruited varieties adapted to cultivation as standards under the climatic conditions of the Karaganda province.

**Pear**

Trials of 21 varieties have shown that only three are sufficiently hardy for cultivation as standard trees, e.g. Limonovka [Lemon], a variety developed by Lukašov and the wild *Pyrus ussuriensis*, the latter having fruits of inferior quality.

**Plum**

None of the 33 cultivated varieties tested has been hardy enough for Karaganda. Semiwild hardy plants of *Prunus nigra* and *P. ussuriensis* have been used as material for selection. As a result, two new varieties Dolinskaja Krasavica [Dolinskaja Beauty] and Dolinskaja Rozovaja [Pink Dolinskaja] have been obtained. They produce fruits which weigh 30 gm. and have a good flavour.

**Cherry**

Over 40 varieties are under trial. *Prunus fruticosa* and *P. Besseyi* have proved adapted to the local climatic conditions. Some hybrids

between Mičurin varieties on the one hand, and *P. fruticosa*, *P. tomentosa* and *P. Besseyi* on the other have been obtained. Cherry-plum hybrids are produced with relative ease, but their fruits are susceptible to injury by cherry weevil. Selection of *P. Besseyi* for large fruits and good flavour is in progress.

**Small bush fruits**

Novostj Kuzjmina [Kuzjmin's Novelty], Visluha [Drooping], Feniks [Phoenix], Goliath and King have given a good account of themselves in the trials of 31 raspberry varieties.

Lija Plodorodnaja [Productive Lia] and Neapolitanskaja [Neopolitan] currants have been found more productive than a local black currant variety. The trials extended over 33 varieties of currants.

Most of the 18 varieties of gooseberry tested proved susceptible to *Sphaerotheca*. A variety, Dolinskaja Rozovaja [Pink Dolinskaja], showing resistance to the disease has been selected.

The recently introduced strawberry varieties Mysovka [Bay], Komsomolka [Komsomol] and Selekcionerka [Breeder] give yields 2–3 times higher than locally grown varieties.

Several varieties of vine are under trial.

670. PUTOV, V. S.  
(The plum in Siberia).

Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 8 : 31–36. [Russian].

Several hardy plums, including some new varieties cultivated in the Altaï territory, are described.

Mančžurskaja Krasavica [Manchurian Beauty], derived from *Prunus ussuriensis*, is a small tree living 15–20 years. It comes into bearing in the fourth year and produces 15 to 18 kg. fruit per tree. The fruits are conical and red with a bluish bloom. They weigh 15.5 gm. each and reach maturity in September. The flesh is greenish yellow, juicy and of good flavour.

Želtaja Hopty [Yellow Hopta] is a medium tall tree coming into bearing in the fifth year. The yield is 10 kg. per tree. The fruits are round and yellow with orange cheeks and flesh of good flavour. They weigh 16 gm. each and reach maturity in September.

Several seedlings have been selected at the Čemal Branch Fruit Station, including *P. ussuriensis* seedlings derived from Karzinskaja [Karzin], a variety originating from the Omsk Province.

Descriptions are given of Karzinskaja 4–6, Karzinskaja 4–7, Karzinskaja 1–11 and Karzinskaja 4–3. They are productive, hardy and yield attractive fruits of good flavour. All of

them, except Karzinskaja 1-11 which is earlier, reach maturity in September. The fruits of the early variety are larger than those of the other Karzinskaja seedlings.

Mention is made of cherry-plum hybrids cultivated in the Altai territory. These include varieties Desertnaja [Dessert] and Novinka [Novelty] bred by Tihonov in Siberia.

Desertnaja, from the cherry-plum hybrid Opata x *P. ussuriensis* is productive and moderately hardy. The fruits are reddish mauve with a bluish bloom and pale greenish flesh. They weigh 16.2 grm. The stone is medium-sized and free. The flavour is superior to that of most cherry-plum hybrids. The variety reaches maturity in September.

Novinka, from *P. Besseyi* x *P. ussuriensis*, is remarkable for its hardiness. The fruits are round, black with bloom, and have dark red flesh when ripe. They weigh 6.8 grm. The skin is thin and the stone small and free. The variety reaches maturity in September.

671. CHAMBERLAIN, E. E.,  
ATKINSON, J. D. and  
HUNTER, J. A.  
**Plum-mosaic, a virus disease of  
plums, peaches and apricots in New  
Zealand.**  
N.Z. J. Sci. Tech. 1951 : 33 : Sec. A :  
No. 2 : 1-16.

Species of *Prunus* and their horticultural varieties which have been found to be natural or experimental hosts of the plum mosaic virus are listed. Information is provided upon the wide range of symptoms produced on species and varieties or even the same variety. Differences in symptoms may be partly due to the occurrence of virus strains. The disease has an adverse effect upon the survival of buds of some plum and apricot varieties when worked on infected cherry plum stocks.

672. SIMONDS, A. O.  
**Transmission of apricot ring pox to  
peaches and plums.**  
Plant Dis. Reporter 1951 : 35 : 189-90.  
(Mimeographed).

Experiments undertaken by the Colorado Agricultural Experiment Station have shown that ten plum and five peach varieties commonly grown in the state act as carriers of the virus causing apricot ring pox. The apricots Moorpark, Montgamet, Jones, Early Horn, Chinese, Reece and Oliver proved susceptible to ring pox transmitted by all fifteen varieties; although Royal apricot showed no symptoms of

infection it carried and transmitted the virus as readily as the plum and peach varieties.

673. ZELENSKIĬ, M. A.  
**(The varieties of plum).**  
Agrobiologija (Agrobiology) 1951 : No.  
1 : 55-65. [Russian].

Large scale varietal trials of plums in the different climatic zones of the Ukraine are reported. Of the 154 plums, which are being tested, 84 are old varieties. More recently bred material includes some seedlings selected from the local Ukrainian plums and several Mičurin varieties. Promising results have been obtained by clonal selection of Renklod Zelenyi [Green Gage], Ugorka Ažanskaja, Anna Spät and Opošnjanskaja. The method is recommended for improving the yielding capacity of Renklod Reforma [Reform Gage], Renklod Kolhoznyĭ [Collective Farm Gage] and other varieties of recent origin.

674. SIDDAPPA, G. S.,  
MOHD. ISHAQ and  
CHUGHTAI, I. D.  
**Canning of peaches and plums in  
Baluchistan.**  
Indian J. Agric. Sci. 1950 : 22 : 149-63.

The locally developed white plums Alucha, Quetta Gage, Peshawari, K 1 and Yellow Alucha are better adapted to canning than the more highly coloured local varieties. None of the local clingstone peaches are suitable for canning, although Sims, Gaume, Peak and Palora, introduced from California, have proved acceptable. Freestone peaches such as the local Parvin and the American varieties Elberta, Lovell, Salway, Babcock and Lukens Honey are all recommended for canning.

675. ZWINTZSCHER, M.  
Experimentelle Untersuchungen zur  
Züchtung von Obstgehölzen mit frost-  
widerstandsfähigen Fruchtknospen und  
Blüten. II. *Prunus*-Formen. (**Ex-  
perimental investigations on the  
breeding of fruit trees with frost  
resistant fruit buds and flowers. II.  
Prunus forms**).

Z. Pflanzenz. 1951 : 30 : 315-43.

From the material used in this study no exact genetic analysis of the inheritance of frost resistance in forms of *Prunus* was possible since the progeny was derived in the main from open pollination.

The variety Frühe Fruchtbare [Early Prolific], which is relatively resistant, was found to



transmit this character and should prove useful in breeding.

*Prunus cerasifera*, though regarded as resistant, showed a quite high degree of frost injury.

676. JACKSON, T. H. and  
ROGER, B. E.

**Plum variety trials at the horticultural station, Molo, Kenya.**

E. Afr. Agric. J. 1951 : 17 : 24-26.

Details are given of the relative performances of 28 Japanese plum varieties and 2 varieties of prune undergoing observational trials for adaptability. Those recommended are Apricot, Jardine's Early, Methley, Settler, Tazagine and Wilson for 6500 ft. and upwards, Hale for planting above 7000 ft. and Beauty, Beckie Smith, October Purple, Satsuma and Shiro for regions above 8000 ft.

677. ELISEEV, I. P.

**(The Garbatovskaja cherry deserves more attention).**

Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 7 : 16-17. [Russian].

Extensive propagation of the Garbatovskaja [Garbatov] cherry, an old local variety, which developed from Vladimirskaia [Vladimir], is advocated. The variety is remarkable for quality and is a good pollinator variety for various varieties.

Mention is made of the recently developed local varieties Rožalaja [Fecund] yielding 100 kg. fruit per tree, Krupnokostočkovaja [Large Stone], Roditeleva [Roditelev's], which has large sweet brown fruits with small stones, and Zolotovka [Gold], remarkable for its large fruits.

678. MORRIS, H. E. and  
AFANASIEV, M. M.

**Winter injury to sweet cherries in Montana.**

Plant Dis. Reporter 1951 : 35 : 192-93. (Mimeographed).

The degree of winter injury reported from Flathead Lake, Mont., differed among varieties. Many orchards pollinated by Stark Golden had a better fruit set than those using other varieties as pollinators. Lambert appeared to be the most resistant fruiting variety.

679. KAZJMIN, G. T.

**(The cultivation of the cherry in the Far East).**

Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 6 : 23-26. [Russian].

Breeding cherries for hardiness at the Far Eastern Scientific Research Institute of Agriculture, Habarovsk, is reported. The Mičurinitse

methods now used consist of training seedlings of *Prunus tomentosa* and an interspecific hybrid between *P. tomentosa* and *P. Besseyi* upon hardy *P. ussuriensis* stocks. Descriptions are given of the hardy seedlings 51, 55, 71, 137 and 139, which have been selected and are being reproduced for large scale trials. Their fruits weigh between 2 and 2.7 grm., and are either pink or dark red. The six year old seedling 71 produces the sweetest fruits. The flavour of the fruits of other seedlings, which are between five and seven years old, is good. The yields varied in 1950 between 3.5 kg. and 4.7 kg. per tree. Peščano-Voiščnyj 1 [*P. tomentosa*-*P. Besseyi* hybrid 1], obtained by back-crossing *P. tomentosa* x *P. Besseyi* to *P. tomentosa* is also described. Its fruits are dark red and sweet and weigh 1.5 grm. It yields 3.5 kg. cherries per tree.

680. BALDINI, E.

**Osservazioni sulla ereditarietà di alcuni caratteri del pesco. (Researches on the inheritance of certain characters of the peach).**

Ann. Sper. Agrar., Roma 1951 : 5 : 879-93.

Observations on peach varieties and a number of  $F_1$  hybrids showed a constant correlation between the colour of the fruit flesh and that of the tissue of the floral receptacle, yellow being recessive to white and conditioned by a single gene. The observations confirmed the monofactorial inheritance of rough skin, which is dominant to the smooth skin of the nectarine, most of the peach varieties being apparently homozygous.

The presence of glands at the base of the leaves proved partially dominant; homozygous recessives are rejected in breeding because of their greater susceptibility to diseases such as *Sphaerotheca pannosa* and *Taphrina deformans*. The results of crossing parents differing in time of ripening varied according to the parental combinations; the hybrids were generally more or less intermediate but cases of transgression occurred. No correlation was observed between time of flowering and time of ripening, so that it should be possible to breed varieties combining late flowering with early maturity.

681. VOLKOVA, E. P.

**(The peach variety Sejanec Volkovo).**

Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 8 : p. 76. [Russian].

A late variety, Sejanec Volkovo [Volkova's Seedling], showing resistance to leaf curl and producing fruits with good keeping properties, was obtained at Soči. It is a seedling of Salway.

It is a tall tree flowering in mid-April and reaching maturity in October. The variety is annually bearing and productive. The fruits weigh 130 to 303 grm. and are pale yellow with dark red cheeks and yellow flesh of good flavour. The skin is firm. The fruits can be processed.

682. TURRELL, F. M. and  
SCOTT, F. M.  
**Effect of elemental sulfur dust on growth of citrus leaves, and its relation to the buffer capacity of the leaf-tissue fluid.**  
Amer. J. Bot. 1951 : 38 : 560-66.

At the California Citrus Experiment Station, weekly dusting with sulphur caused reduced growth in leaf length and premature leaf abscission of Marsh grapefruit and Eureka lemon but the leaves of Valencia and Washington Navel oranges showed increased growth. Resistance to the deleterious effects of sulphur is correlated with a high buffer capacity of the leaf sap.

683. WALLACE, J. M.  
**Recent developments in studies of quick decline and related diseases.**  
Phytopathology 1951 : 41 : 785-93.

Inoculations with quick decline virus at the California Citrus Experiment Station produced indeterminate reactions on numerous species and varieties of citrus. On West Indian (Mexican) lime seedlings, however, diagnostic foliage symptoms developed rapidly; these seedlings will be used as indicators in future. An analysis of data from independent investigations concerning stem pitting in South Africa, lime disease in West Africa and tristeza [sadness] in Brazil suggests that these citrus diseases and quick decline are caused by the same virus or closely related strains.

684. LUSTIG, J. [Y.].  
**(Rind puffing in Valencia oranges).**  
Hassadeh 1951 : 31 : 496-97. [Hebrew].

In 1950, when occurrence of this disease was severe, it was the Ferush (= Valencia) and other thin-skinned varieties such as Biladi [Native] and Tsorfati that suffered most. All grapefruit varieties and the Shamuti orange withstood the attack.

685.  
**Status of certain varieties and hybrids of citrus in relation to quick decline.**  
Calif. Citrogr. 1950 : 35 : 212-13.

Varieties and hybrids known to be capable of

carrying the virus responsible for quick decline disease are listed. Hybrids possessing at least one parent capable of carrying the virus are also included.

686. MAISURADZE, N. I.  
**(The development of seed in navel oranges).**  
Agrobiologija (Agrobiology) 1951 : No. 1 : 105-08. [Russian].

Viable seed from navel oranges was obtained at Suhumi as a result of artificial cross pollination. Fruits containing most seeds were obtained from pollinations of the navel orange with pomelo or with pollen mixtures including pomelo. The F<sub>1</sub> plants from the various crosses are listed.

687. HODGSON, R. W.  
**Small size citrus fruits may be a genetics problem.**  
Calif. Agric. 1947 : 1 : No. 12 : 1, 4.

Although it is thought that sour orange rootstocks tend to reduce the size of oranges produced by the varieties Hamlin in Florida and Valencia in California, and that choice of other stocks would improve the size of oranges, a breeding programme with large fruited varieties as its objective is advocated.

688. FROST, H. B. and  
CAMERON, J. W.  
**Frua and Dweet. Two new citrus varieties that produce good-sized fruit with tangerine-like flavor.**  
Bull. Calif. Agric. Exp. Sta. 1951 : No. 721 : Pp. 10.

Two new varieties have been developed from crosses with the Dancy tangerine at the California Citrus Experiment Station. Frua (King x Dancy) is an early ripening tangerine; the fruits resemble Dancy in colour, ease of peeling and flavour, but are larger and contain fewer seeds. Although Frua has a short fruiting season, its earliness is a desirable characteristic. The other variety, Dweet, originated from Mediterranean Sweet orange x Dancy. Dweet produces fruit of orange size but somewhat pear-shaped; its flavour resembles Dancy. This variety has such tender segments and high juice content that it is best used for juice extraction. The fruiting season is similar to that of Mediterranean Sweet. Both Frua and Dweet are well adapted to the navel orange districts of southern California.



689. BENTON, R. J.,  
BOWMAN, F. T.,  
FRASER, L. and  
KEBBY, R. G.  
**Stunting and scaly butt of citrus associated with *Poncirus trifoliata* rootstock.**  
Sci. Bull. N.S.W. Dep. Agric. 1950 : No. 70 : Pp. 20.

Investigations concerning the variability in degree of development of scaly butt and associate stunting symptoms among different citrus varieties growing on *P. trifoliata* rootstocks in New South Wales have revealed that scaly butt is due to a virus infection. Although the late Valencia orange and main varieties of mandarin are resistant to this disease, Washington Navel orange and certain varieties of grapefruit have occasionally shown symptoms of infection and lemons are always susceptible if grown on *P. trifoliata*. In cases of occasional infection, the use of scions from virus free trees is recommended when grafting on *P. trifoliata* rootstocks. As all lemons appear to be affected, further investigations of the reaction of seedling scions to the scaly butt virus are in progress.

690. GOOR, A.  
**[Whoso keepeth the figtree shall eat the fruit thereof. (Concl.)].**  
Hassadeh 1951 : 31 : 494-96. [Hebrew].

Information is given on the best introduced and local fig varieties grown in Israel, whether for drying, preserving or fresh consumption.

691. MILJAEV, A.  
**(The question of coordinating different branches of industry on collective farms growing cotton).**  
Socialističeskoe Seljskoe Hozjaistvo (Socialistic Agriculture) 1951 : No. 3 : 17-25. [Russian].

Mention is made of the early varieties of mulberry, S-28 and S-010, bred by Mičurinite methods at the Central Asiatic Institute of Silk Industry.

692. SCHROEDER, C. A.  
**Fruit morphology and anatomy of the cherimoya.**  
Bot. Gaz. 1951 : 112 : 436-46.

Variations in fruit form, surface characters, density of epidermal hairs and stomatal frequency are described; these have been used as a basis for grouping specimens of *Annona Cherimolia* into horticultural types.

693. GANGOLLY, S. R. and  
DALJIT SINGH  
**Distribution of the mango (*Mangifera indica* L.) and its varieties.**  
Indian J. Hort. 1951 : 7 : Nos. 3-4 : 7-16.

The distribution of the mango and its varieties in the different climatic regions of India is surveyed.

694. MORT, C. H.  
**Almond variety and stock trials.**  
Agric. Gaz. N.S.W. 1951 : 62 : 247-50, 262-64.

The results so far obtained from almond variety and stock trials at the Wagga Agricultural College and Experiment Station, NSW, are reported. Descriptive notes on 11 varieties are given. Hatch's Nonpareil and Chellaston are recommended for the main plantings.

695.  
**Improved varieties of oilseeds.**  
Indian Fmg 1951 : 1 : No. 5 : 26-28.

The characteristics of 17 groundnut varieties namely, AH 25, AH 32, AH 698, AH 334, Samrala Local, HG 1, HG 3, Pondicherry 8, Spanish 5, Spanish Improved, Pepargaon 1, Pepargaon 3, T 25, Improved Spanish Peanut, AK 12-24, Improved Small Japan (Red Netal) and AK 10 (Bold), developed for use in six Indian states are presented in tabular form. All 17 varieties give increased seed yields and many have a higher oil content than local strains. Drought resistant varieties include AH 25, Spanish Improved and HG 1 and 3; HG 1 and Spanish Improved have a high degree of disease resistance; and AH 32, Improved Spanish Peanut, Pondicherry 8, Spanish 5 and Red Netal are early maturing.

696. GOPALA IYENGAR, K. and  
SREENIVASA IYENGAR, G.  
**Vigour in groundnuts.**  
Curr. Sci. 1951 : 20 : p. 186.

Vigorous types with satisfactory pod yield and increased production of haulms for livestock are being sought by the Department of Agriculture, Bangalore. Two  $F_2$  hybrids, HG 6 from a cross between Mysore Local and Spanish, and HG 6 from a cross between Virginia and Small Japan, have given 2-3 times the haulm yield normally produced and pod yields comparable with those of commercial varieties. They are hardy and resistant to drought and *Cercospora*.

697. BOLHUIS, G. G.  
Natuurlijke bastaardering bij de aardnoot (*Arachis hypogaea*). [Natural hybridization in the groundnut (*A. hypogaea*)].  
Landbouwk. Tijdschr. Wageningen 1951 63 : 447-55.

The evidence from various countries for and against cross pollination in groundnuts and the possible significance of the east and west monsoons as factors affecting the amount of crossing that might occur are considered. Some unpublished results of Koch are cited. Using the same varieties as Koch and also a red-seeded variety, the author investigated crossing in Java. He found that under certain conditions there were marked differences in the amount of natural crossing between different varieties. For some varieties, over seven feet between adjacent plots may not ensure against natural crossing.

Natural hybridization is attributed either to more rapid growth of the foreign pollen tubes or to the secretion by them of some substance inhibiting self-pollen-tube growth.

Possible reasons for the low percentages of crossing in the west monsoon are suggested.

698. VAN HOOF, H. A.  
**Disease of groundnut caused by *Cercospora personata* (B. and C.) E. and E. and *Cercospora arachidicola* Hori.**  
Contr. Gen. Agric. Res. Sta., Bogor 1950 : No. 114 : Pp. 17.

Differences in the reaction of strains of groundnut to *C. personata* and *C. arachidicola* are noted (cf. *Plant Breeding Abstracts*, Vol. VI, Abst. 633) in a detailed account of the diseases caused by these pathogens in Indonesia.

699. HARTMANN, H. and  
PAPAIOANNOU, P.  
**Olive varieties in California.**  
Bull. Calif. Agric. Exp. Sta. 1951 : No. 720 : Pp. 55.

The bulletin describes the chief varieties cultivated in California and their strains; numerous varieties now found only as scattered trees and orchards; introductions obtained by the US Department of Agriculture; and imported varieties being tested on the Mission rootstock at the University of California. Tables showing size and weight measurements of the fruits and pits, oil content and bearing habits of over 50 varieties are provided.

700. SAMISH, Z.  
**[The olive industry in Greece and Turkey. (Contd.)]**  
Hassadeh 1951 : 31 : 279-82 [Hebrew].

The Turkish culinary olives described are Gemlik Trilya, which has round fruit and a large kernel, Tsalbi, with large, heavy fruit and a long, narrow kernel, and the large-fruited Milas and Karamuze. On account of their low oil content these large olives are rarely grown, but they may be of use to the preserving industry.

With regard to olives for oil, Leccio [Holm Oak] and Frantojo [Oil Press] gave poor results. Spagna, Cordalis and Ascolano were better.

The Greek varieties described are Konservolia and Kalamata, with a low oil content, of use in the preserving industry, and Megaretiki, Koroneiki and Thrombolia, which have a higher oil content, up to 27.4% in the case of the last named variety.

701. KUMAR, V.  
**Studies in *Carica papaya* Linn. 1. Preliminary observations on the relation of sex to the pre-flowering growth of papaya seedlings and external characters of seeds.**  
Indian J. Hort. 1951 : 8 : No. 1 : 26-33.

The results of preliminary studies suggest that (1) seeds having a deeper brown colour produce a comparatively higher percentage of fruit-bearing plants, and (2) staminate seedlings show a higher rate of stem elongation than pistillate or hermaphrodite plants at the age of 12 weeks.

702. BEN-HAIM, N.  
**(The Ettinger avocado).**  
Hassadeh 1951 : 31 : 338-39. [Hebrew].

This variety originated from seed brought to Israel by Ettinger. Of his sowings, only one tree reached maturity, and scions from this tree were used for the subtropical plantations at Mikveh Israel from 1945 onwards. Yields from the Ettinger avocado compare well with those from other varieties. The fruit is 12-14 cm. long, 8-9 cm. wide, and weighs between 350-600 grms. Its skin is green with numerous projecting lenticels. The flesh is greenish, especially near the skin.

703.  
**California Avocado Society 1950 Yearbook : Pp. 224.**

*Rounds, M. B. Report of the Avocado Variety Committee. (pp. 19-20).*

The list of varieties recommended for commercial planting remains the same as in previous years



but certain changes in area recommendations are reported. Varieties under trial are briefly described.

*Avocado varieties registered during 1950.* (p. 22).

Descriptive notes are given on eight varieties.

*Schroeder, C. A. Report of the Committee on Minor Subtropical Fruit Varieties.* (pp. 23-26).

The importance of selecting seedlings with superior commercial characters from among privately owned plantations of white sapote, feijoa, *Macadamia* and other minor fruits is emphasized for the rapid production of improved varieties. Many selections of *Macadamia* made in Hawaii are being tested for their adaptability to Californian conditions.

*Griswold, H. Report on the Committee on Foreign Explorations.* (pp. 28-30).

Fruit produced by Pryor, a hybrid of Mexican x West Indian origin, is too small for commercial purposes but the high degree of frost resistance shown by the tree under California conditions may be valuable for breeding purposes. The seedling is being tested as a rootstock. As resistance to frost is presumably derived from the Mexican parent, tests are under way to determine the degree of salt resistance, a character which may have been inherited from the the West Indian parent. A rootstock having resistance to frost and salt would be of value to many growers.

The wild *Persea floccosa* from Aquila, Mexico, has shown resistance to root rot in California.

*Hodgson, R. W.; Schroeder, C. A. and Wright, A. H. On the comparative resistance of the avocado and certain other tender subtropicals and tropicals to low winter temperatures.* (pp. 32-44).

Mexican varieties show a higher degree of resistance to low temperatures (23° F) experienced during recent winters than the Fuerte or Guatemalan races. Observations made on the injuries sustained by other minor fruits are recorded.

*Sharp, P. F. The experiment station and the avocado industry.* (pp. 53-59).

Research carried out at the California Agricultural Experiment Station to develop improved avocado varieties and rootstocks is briefly mentioned.

*Zentmyer, G. A. Avocado root rot.* (pp. 63-67).

Varieties with resistance to root rot (*Phytophthora Cinnamomi*) are being sought.

*Popenoe, W. Report from Honduras.* (pp. 116-23).

Further information is presented concerning the relationship between cultivated avocados and their wild relatives and ancestors (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1904). The performances of many introductions undergoing tests for root rot resistance are described.

*Sharpe, F. V. The avocado in Australia.* (pp. 124-25).

Varieties of Californian origin which perform well in the restricted avocado growing region near Brisbane are listed.

*Rounds, M. B. Check list of avocado varieties.* (pp. 178-205).

Varieties registered with the California Avocado Society are reported.

704. **BAKER, R. E. and BUTTERFIELD, H. M. Commercial bush berry growing in California.**  
Circ. Calif. Agric. Ext. Serv. 1951 : No. 169 : Pp. 50.

Notes and charts describing varieties of trailing and erect blackberries, raspberries, currants, gooseberries and blueberries are included.

705. **POTTER, J. M. S. Report of the National Fruit Trials 1921-1950. Part II.**  
J. R. Hort. Soc. 1951 : 76 : 280-93.

The results of trials of black currant, red currant, gooseberry, blackberry, raspberry and strawberry varieties at Wisley, England and of cherries at the Kent Farm Institute are summarized. Descriptions of the varieties studied are given. In Appendix I the flowering periods of the new apple, pear and plum varieties also tested (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2859) are tabulated; Appendix II provides tables indicating suitable pollinating varieties for the latter tree fruits.

706. **CADMAN, C. H. Raspberries in Scotland.**  
Sci. Hort. 1950-51 : 10 : 24-33.

Choice of varieties suitable for growing in Scotland is becoming increasingly influenced by fruit quality. Ten commonly grown varieties are compared in respect of numerous characteristics, including suitability for canning, quick freezing and dessert purposes.

707. JOHNSTON, S.  
**Problems associated with cultivated blueberry production in northern Michigan.**  
 Quart. Bull. Mich. Agric. Exp. Sta. 1951 : 33 : 293-98.

At present only the highbush blueberries Keweenaw (cf. Abst. 708) and Rancocas are recommended for trial in northern Michigan, chiefly near the Great Lakes. Hybrids between native lowbush selections and highbush blueberries will probably be better adapted to areas with shorter growing seasons than these two varieties. The undesirable characters of the lowbush blueberry are almost completely dominant in the  $F_1$ ; it is however hoped that suitable hybrids will be secured in the  $F_3$ .

708. JOHNSTON, S.  
**The Keweenaw blueberry : a variety for trial in northern Michigan.**  
 Quart. Bull. Mich. Agric. Exp. Sta. 1951 : 33 : 299-301.

The highbush blueberry Keweenaw, an open-pollinated seedling of Katuarine, is being released for trial; it is recommended chiefly for areas close to the Great Lakes where the average length of the growing season is 145 days or more. Its berries are light blue, large, firm and of good flavour. The variety has shown freedom from leaf spot and other diseases.

709. DEMAREE, J. B. and MORROW, E. B.  
**Relative resistance of some blueberry varieties and selections to stem canker in North Carolina.**  
 Plant Dis. Reporter 1951 : 35 : 136-41. (Mimeographed).

Although all standard varieties of rabbit eye blueberry (*Vaccinium Ashei*) are either immune or have a high degree of resistance to stem canker (*Phylospora corticis*), wide variation in reaction to this disease occurs among cultivated highbush blueberries (*V. australe*). Information given on the resistance ratings of numerous varieties and selections shows that of several northern varieties grown in the south only Atlantic, Jersey and Scammel have a high degree of resistance. A few selections from wild highbush clones, known as Crabbe 4, 6, 11 and 17, have transmitted canker resistance when crossed with susceptible northern varieties possessing desirable fruit qualities; Murphy and Wolcott (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 2615) have already been released, while other unnamed selections are undergoing final trials.

710. SCOTT, D. H.  
**Cytological studies on polyploids derived from tetraploid *Fragaria vesca* and cultivated strawberries.**  
 Genetics 1951 : 36 : 311-31.

Cytological studies were carried out on a colchicine-induced autotetraploid of *F. vesca* ( $2n = 28$ ) and on hybrids derived from crosses between the autotetraploid and cultivated strawberry. Hybridization between the autotetraploid and cultivated strawberry resulted in hexaploids with a low degree of fertility. The hybrid hexaploids showed very irregular meiosis and frequently produced unreduced gametes. Seedlings with  $2n = 49, 70$  and  $77$  were obtained from crosses between the hexaploids and cultivated octoploids. The plants with  $2n = 70$  apparently arose from the fertilization of unreduced gametes of the hexaploids by normal gametes of the cultivated strawberry. The single plant with  $2n = 77$  must have originated from the union of an unreduced octoploid gamete and a reduced gamete of the hexaploid. Hybridization between decaploids and octoploids yielded sterile enneaploids. The decaploids carry 14 chromosomes from *F. vesca* and 56 from the cultivated strawberry; they are relatively fertile and some possess the desirable aroma of *F. vesca*. Crosses between decaploids resulted in relatively fertile seedlings. It is suggested that breeding for highly aromatic strawberries should be carried out at the decaploid level.

711. SMOLJANINOVA, N. K.  
**(Interspecific hybrids between the cultivated and wild strawberry).**  
 Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 6 : 20-22. [Russian].

Breeding work at the Moscow Fruit Research Station is reported. Several hybrids, which combine the yield characters of the cultivated strawberry with the hardiness and flavour of the wild strawberry, have been obtained.

Sejanec 9 [Seedling 9] was bred from (Late Leopold Hall x Španka) x [Sejanec Kažera (Emperor's Seedling) x Milanskaja (Milan)] x Milanskaja. It has the habit of the wild strawberry, produces many runners and is hardy. The first fruits are larger than those of Španka and Milanskaja, although they resemble them in appearance. The flesh is whitish, tender, juicy and sweet, and has the flavour of a wild strawberry.

Sejanec 15 [Seedling 15] was derived from (Late Leopold Hall x Španka) x (Sejanec Kažera x Milanskaja) x Milanskaja. It has female flowers and habit, foliage and fruit resembling those of



the wild strawberry. The first fruits weigh 6.2 gm., the later 4.3 gm. The fruits are red with a mauve tinge. The flesh is very tender and sweet and has a wild strawberry flavour. Sejanec 3 [Seedling 3], from Sejanec Kažera x Milanskaja, has the appearance of a cultivated strawberry and the flavour of a wild strawberry and has perfect flowers. The first fruits weigh 6.7 to 8.3 gm., the later fruits 5.4 gm. The flesh is red, firm and juicy and has good keeping properties.

712. KAŠIČKINA, M. I.

(**New varieties of strawberry for the Tambov province**).

Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 6 : 17-18. [Russian].

Several varieties, bred at the Mičurin Scientific Research Institute, are described. They have been made standards in the Tambov province and are under trial in the Voronež, Kursk, Orel and Rjazanj provinces and the Mordva ASSR. Rubinovaja [Ruby], from Late Leopold Hall x Louise, yields 10 tons of fruit per ha. It is hardy and tolerant of drought. The fruits weigh 10 gm. They are dark red, ribbed, glossy and of good flavour. The variety reaches maturity at the same time as Saksonka [Saxon].

Russkaja [Russian], from the same cross, is hardy and yields 8 tons of fruit per ha. The fruits are round, dark red and glossy and weigh 9 gm. Their flavour is good. The variety reaches maturity in June.

Maršaljskaja [Marshall's], from Late Leopold Hall x Marshall is similar to Russkaja, except that it is less moderate in moisture requirements. The fruits weigh 10 gm. and vary in shape according to their position on the plant. They are orange red, glossy and of good flavour and reach maturity at the same time as their female parent. Udarnica [Shock Worker], from Saksonka x Pobeditelj [Victor] differs from Russkaja only in respect of its pale red fruit colour.

713. KATINSKAJA, JU. K.

(**New strawberry varieties for the northwestern zone**).

Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 6 : 18-20. [Russian].

Several varieties bred at the Pavlovsk Experimental Base of the USSR Institute of Plant Industry are described. They have good quality fruits and are productive and hardy under Leningrad conditions.

Clonal selection of the following most productive new varieties is in progress. Pavlovskaja

Krasavica [Pavlovsk Beauty] was bred from Roščinskaja x Saksonka [Saxon]. It has perfect flowers. The first fruits weigh 27 gm. and have uneven shape. Fruits picked later for dessert or jam making are oval, bright red, glossy, and with reddish yellow seeds. The flesh is pink, juicy and of good flavour.

Novinka [Novelty] was bred from Uspeh [Success] x Belaja Ananasnaja [White Pineapple]. It has perfect flowers. The first fruits weigh 36 gm. and are asymmetrical, broad and ribbed. Later fruits are conical. The flesh is pale pink, juicy and of good flavour. Novinka reaches maturity five to six days after Roščinskaja.

Leningradskaja Pozdnjaja [Late Leningrad] from Saksonka x Pobeditelj [Victor] shows resistance to grey mould. It has perfect flowers. The fruits are large, round, dark red, glossy and of even shape. The flesh is firm and pink and of good flavour. The fruits make good jam and may be eaten fresh.

Pozdnjaja iz Pavlovskaja [Late Pavlovsk], from Late Leopold Hall x Saksonka, is late in maturity and continues bearing into mid-August. It has perfect flowers. The first fruits weigh 32 gm. and have uneven shape. Later fruits are medium large, round and bright red. The flesh is pink and of good flavour.

714. HICKMAN, C. J. and  
ENGLISH, M. P.

(**The susceptibility of strawberry varieties to red core**).

Trans. Brit. Mycol. Soc. 1951 : 34 : 356-59.

A technique is described by which rapid estimates of susceptibility to *Phytophthora Fragariae* were made with potted plants whose field reactions were already known; varietal reaction in the pot tests proved a reliable indication of behaviour in the field. Using Huxley, Perle de Prague and Auchincruive Climax, evidence was obtained for the existence of at least three races of the pathogen in Great Britain.

715. SCOTT, D. H.,  
JEFFERS, W. F.,  
DARROW, G. M. and  
INK, D. P.

(**Further studies on the response of strawberry varieties and selections to strains of the red stele root disease fungus**).

Plant Dis. Reporter 1951 : 35 : 134-35. (Mimeographed).

Although 15 additional varieties and selections tested at Maryland Agricultural Experiment

Station showed resistance to only strain A or S of *Phytophthora Fragariae* (cf. *Plant Breeding Abstracts*, Vol. XX, Abst. 1912), selections US 3535 and US 3538 were moderately resistant to both A and S. It is hoped that commercially desirable varieties with resistance to both strains will soon be available.

716. FALL, J.  
**Studies on fungus parasites of strawberry leaves in Ontario.**  
Canad. J. Bot. 1951 : 29 : 299-315.

Varieties of strawberry commonly grown in Ontario vary in their degree of resistance to leaf spot (*Mycosphaerella Fragariae*) and scorch (*Diplocarpon earliana*). Premier shows a high degree of resistance and rarely becomes infected during epidemics in the field.

The expression of symptoms of leaf blight (*Dendrophoma obscurans*) and blotch (*Gnomonia fruticola*) also differs in many varieties.

717. KEYWORTH, W. G. and BENNETT, M.  
**Verticillium wilt of the strawberry.**  
J. Hort. Sci. 1951 : 26 : 304-16.

An account is given of the reaction of strawberries grown in Great Britain to *V. alboatrum* and *V. Dahliae*. None of the common varieties possesses resistance to *V. alboatrum*. During trials on infected soil at East Malling Research Station in 1946, King George, Royal Sovereign and Auchincruive 10 appeared more vigorous than other varieties and wilt symptoms were very slight, but in 1947 all varieties showed severe symptoms. It seems probable that varieties differ in their degree of susceptibility to wilt but that under epidemic conditions such differences are not obvious.

718. MELLOR, F. C. and FITZPATRICK, R. E.  
**Studies of virus diseases of strawberries in British Columbia. II. The separation of the component viruses of yellows.**  
Canad. J. Bot. 1951 : 29 : 411-20.

The transference of the yellows vector, *Capitophorus fragaefolii*, from yellows infected Marshall plants to a succession of *Fragaria vesca* indicators has resulted in the isolation of at least two virus components, a persistent and a non-persistent type. The latter caused such varied symptoms that it is assumed to be a complex of strains.

719. FRAZIER, N. W.  
***Fragaria bracteata* Heller as an indicator plant of strawberry viruses.**  
Plant Dis. Reporter 1951 : 35 : 127-28.  
(Mimeographed).

On the basis of preliminary tests in California with *F. bracteata* as an indicator, strawberry viruses can be separated into two groups with respect to their vector relationship as well as symptomology: (1) crinkle and droop viruses which are retained by vectors for less than 24 hours; and (2) relatively persistent viruses which survive in their vectors longer than 24 hours.

720. FITZPATRICK, R. E. and MELLOR, F. C.  
**Studies of virus diseases of strawberries in British Columbia. I. The reaction of the British Sovereign variety and the indicator *Fragaria vesca* to yellows.**  
Canad. J. Bot. 1951 : 29 : 182-88.

Under field conditions, British Sovereign appeared to be immune to the yellows virus which has severely attacked Marshall in the Pacific Northwest. Stolon grafts between the two varieties, however, showed that British Sovereign is susceptible to the virus.

721. MILLER, P. W.  
**An eastern Oregon *Fragaria vesca* suitable as an indicator for some strawberry virus diseases.**  
Plant Dis. Reporter 1951 : 35 : 61-62.  
(Mimeographed).

One of several native strains of *F. vesca* from eastern Oregon tested for degree of sensitivity to virus infection has proved very sensitive; it is easily infected and readily shows disease symptoms. Stolon-grafting is facilitated by the large diameter of runners produced by this strain.

722. WILCOX, R. B.  
**Tests of cranberry varieties and seedlings for resistance to the leafhopper vector of false-blossom disease.**  
Phytopathology 1951 : 41 : 722-35.

Named varieties and hybrid seedlings were subjected to selective tests in which the leafhopper vector (*Scleroracrus vaccinii*) of false blossom virus was provided with a choice of



varieties or hybrids on which to feed. Varieties of known susceptibility to leafhopper tended to transmit their respective degrees of susceptibility to their progeny. Numerous factors appeared to be involved in the inheritance of resistance. Shaw's Success and several hybrid seedlings were more resistant to the vectors than McFarlin, a standard variety exhibiting considerable field resistance. No variety or hybrid was completely immune. The procedure and significance of selective tests are discussed. It is expected that it will be possible to breed varieties with much higher resistance to leafhopper than the cranberries now available. Attention is drawn to the possible problem of physiological races of leafhopper.

723. GOPALAN NAYAR, T.  
**Short notes on banana varieties at Trinidad.**  
 Indian J. Hort. 1951 : 8 : No. 2 : 31-39.

A short account of Cheesman's classification of *Musa* is given, followed by information on varieties in the collection at the Imperial College of Agriculture, Trinidad, and on the crosses effected.

724.  
**Antibiotic substances found in Panama disease-resistant bananas.**  
 World Crops 1951 : 3 : p. 353.

Results of a joint investigation by the Colonial Microbiological Research Institute and the University College of the West Indies show that several strains of bacteria producing antibiotic substances toxic to fungi and other bacteria are present in the roots of bananas which are resistant to Panama disease (*Fusarium oxysporum* var. *cubense*). Such bacteria are rarely found in Gros Michel, a susceptible variety.

725. COLLINS, J. L.  
**Antiquity of the pineapple in America.**  
 Sthwest. J. Anthropol. 1951 : 7 : 145-55.

The degree of genetic variability (cf. *Plant Breeding Abstracts* Vol. XXI, Abst. 2149) which can only have originated by somatic mutation, in the asexually propagated Cayenne variety supports the concept of the great antiquity of pineapple cultivation in America; it is assumed that this variety must have developed long before 1492.

726. STEINGRUBER, P. and MÜLLNER, L.  
 Dreissig Jahre Rebenzüchtung an der Höheren Bundes-Lehr- und Versuchsanstalt für Wein-, Obst- und Gartenbau in Klosterneuburg. II. (**Thirty years of vine breeding at the Federal College and Research Institute at Klosterneuburg for Viticulture, Fruit Cultivation and Horticulture. Part II**).  
 Mitt. höh. Bundeslehr- u. VersAnst. Wein-, Obst- u. Gartenbau Wien- Klosterneuburg, Bienenkunde Wien-Grinzing 1951 : 1 : 89-93.

The situation with regard to the new selections of cultivated varieties of wine and dessert grapes is described. In accordance with the 1922-30 breeding programmes of the Federal Vine Breeding Station 999 crosses and selfings were carried out. Of 8000 individuals, distributed in various vine growing stations and areas, some were grown on their own roots and some grafted on Berl. x Rip. Kober 5BB. In addition, there are a considerable number of seedlings derived from an experimental series for the investigation of the fertilization of female and hermaphrodite varieties of vines. Some aspects of the problem to be dealt with are (i) selfing of female varieties, (ii) crossing of female with hermaphrodite varieties and *vice versa* and (iii) selfing of hermaphrodite varieties.

727. LOMKACI, S. I.  
**(Increasing the productive shoots on vines in Georgia).**  
 Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1951 : No. 8 : 30-32. [Russian].

Pruning methods used in Uzbekistan and Turkmenia are discussed.

Mention is made of productive varieties developed recently at the Central Asiatic Station of the USSR Institute of Plant Industry, the Central Asiatic Branch of the Magarač Institute, the Uzbek Scientific Research Institute of Viticulture and Wine Making and the Ak-Kavak Research Station. These include Pobeda [Victory], Ranniĭ VIR\* [Early VIR], Muskat Uzbekistanskiĭ [Uzbekistan Muscat], VIR-1, Muskat VIR [VIR Muscat] and 544.

728. GARMĭ, J. [Y.], and ZĭEV, S.  
**(Hymoniatica, a late grape variety).**  
 Hassadeh 1951 : 31 : 283-84. [Hebrew].  
 Hymoniatica has won recognition as a good late

\* Vsesojuznyi Institut Rastenievodstva [USSR Institute of Plant Industry].

variety. It is a strong grower with bunches weighing 600–700 grm.; the berries are medium-sized to large, green and have 2–3 seeds.

729. COLELLA, F.  
Gl'ibridi produttori. (**Direct-producer hybrids**).  
G. Agric. Domen. 1951 : 61 : p. 198.

Seyve Villard 12375 and a number of other direct-producer hybrids are recommended for trial as wine or dessert grapes in Italy, to take the place of Clinton, which is extremely inferior in quality, and Italian vine breeders are urged to devote further attention to the production of new hybrids.

730. TITOVA-MOLČANOVA, Z. JA.  
(**The formation of primordial flowers in different varieties of vines**).  
Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1951 : No. 5 : 42–44. [Russian].

Experiments at the Central Asiatic Branch of the Magarač Institute showed that the high fertility of the European varieties is due to a more rapid differentiation of the first flower primordia as a result of which other flower primordia develop.

The long period required for the differentiation of the first flower primordia in the central Asiatic vines accounts for their failure to differentiate any more flower primordia. The buds at the base of the shoots of most varieties were less differentiated than those nearer their distal ends, and their embryonic shoots were shorter. The most active periods of bud differentiation in the different varieties did not coincide.

731. PODRAŽANSKIĬ, A. L.  
(**Supplementary pollination of vine varieties with perfect flowers**).  
Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1951 : No. 4 : 25–29. [Russian].

In experiments conducted at the Ukrainian Institute of Viticulture and Wine Making, intravarietal supplementary fertilization of Ali-goté, Muskat Belyi [White Muscat] and Game Černyi [Black Gamay] has the effect of increasing the yields and size of bunches of these varieties. Supplementary pollinations of European varieties with mixtures of self pollen and pollen from rootstock varieties such as Riparia x Rupestris 3309, 101–14, Rupestris du Lot, Riparia Gloire, and Mourvèdre x Rupestris 1202 similarly improved the yielding capacity.

732. NEGRULJ, A. M.  
(**Vegetative variability in vines**).  
Agrobiologija (Agrobiology) 1951 : No. 1 : 66–70. [Russian].

Several mutations attributed to external conditions are described. They include changes in grape colour, leaf and flower characters, maturity dates, yielding capacity and the development of seedless grapes or a reversion from this type to grapes containing seeds. Reference is made to productive clones of Muskat Belyi [White Muscat] selected in the Crimea, and to hardy clones of Madeleine Angevine obtained by training and selection in the Moscow province.

733. BERIDZE, G. I.  
(**Fruitful scientific research**).  
Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1951 : No. 4 : 58–59. [Russian].

The scientific achievements of the Institute of Viticulture and Wine Making of the Georgian Academy of Sciences are briefly surveyed on the occasion of the twentieth anniversary of its foundation. References are made to vine breeding and yeast culture.

Clonal selection has given the high quality vines Mcvane 12, Rkaciteli 48, Saperavi-Mshvilmtevana and Saperavi-Budišuriseburi and the clones derived from Cicka [Teat], Black Pinot, Colikauri, Odžaleši and Čaveri.

As a result of interspecific and intervarietal hybridization the following new promising varieties have been obtained: Kahuri Saadreo, Mtis Vazi, Rkaciteli x Kisi 3–28, Mcvane x Saperavi 3–22 and Cicka x Chardonné 48–1.

Hybrid vines showing the highest resistance to chlorosis were obtained from Berlandieri x Riparia 5BB, Chasselas x Berlandieri 41B and Berlandieri x Riparia 420A.

Tests for *Phylloxera* resistance showed that Rkaciteli, Mcvane, Činuri and Cicka were the least susceptible varieties. Methods of cultivating these vines as direct producers were developed.

Selection of yeasts has given a culture Kahuri 7, which is now being used for champagne making, several cultures tolerant of high and low temperatures, and a culture capable of fermenting juices with very high sugar contents.

734. PAVLOV, G. D.  
(**Selecting vines in the nursery**).  
Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 7 : 35–36. [Russian].  
Mass selection every 3 to 4 years, clonal selection every year and discarding of unproductive vines in the first year in the nursery are advocated.



735. SIDDAPPA, G. S. and

MOHD. ISHAQ.

**Canning of grapes in Baluchistan.**

Indian J. Agric. Sci. 1950 : 22 : 101-06.

An investigation concerning the suitability of locally grown grapes for canning has shown that the seedless sultana type is of excellent canning quality; the large-seeded haitha grapes tend to split after processing.

736. KONDO, G. F. and

RO, I. L.

**(Raw material for champagne making in central Asia).**

Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1951 : No. 4 : 22-27. [Russian].

Trials at the Central Asiatic Branch of the Magarač Institute of grapes of several European, Caucasian, Don, Moldavian and central Asiatic varieties of vines showed that many of them were suitable for champagne making. The central Asiatic varieties included a new hybrid 4-13-32 which was bred from Nimrang x Kišmiš Černyi [Black Sultana] at the Central Asiatic Station of the USSR Institute of Plant Industry. The new hybrid has perfect flowers, a high yielding capacity, and is seedless.

737. IVANOVA, E. B.

**(The propagation of the best varieties of vines in the Uzbek SSR).**

Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1951 : No. 6 : 22-24. [Russian].

In trials conducted at the Central Asiatic Branch of the Magarač Institute, several vines adapted to cultivation in Uzbekistan, including Hindogny, Maškiš Černyi [May Black] and Lkeny, have been selected.

738. G., H.

**(A visit to the plantations of the Negev).**

Hassadeh 1951 : 31 : 174-75. [Hebrew].

In an account of an inspection of fruit plantations in the south of Israel vine stock 216-3 is mentioned as giving good results under conditions of high salinity. Stock 41-B suffers under the same conditions. Two other stocks which succeed fairly well in these districts are 93-R and 1202.

739. KONOPLEV, V. F.

**(Vines in the Orel province).**

Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 6 : 48-49. [Russian].

Breeding vines for hardiness at the Vorošilov Collective Farm, Orel province, is reported.

The material selected for further trials includes the hybrids Nimrang x *Vitis amurensis*, Sejanec Malengra [Malingre Seedling] x *V. amurensis*, Čauš x Korinka Mičurina [Mičurin Currant], Madeleine Angevine x *V. amurensis* and Pink Chasselas x *V. amurensis*.

In other trials Severnyi [Northern], Belorozovyi [White Pink] and Višnevyy [Cherry] showed high resistance to cold, but their grapes were small and had indifferent flavour. Severnyi was bred at Mičurinsk from Sejanec Malengra x *V. amurensis*.

Alfa [Alpha], Daljnevostočnyi Tihonova [Tihonov's Far Eastern], Prima and the Mičurin varieties Russkii Konkord [Russian Concord], Severnyi Belyi [Northern White] and Černyi Sladkii [Black Sweet] also proved hardy during the tests.

- 740.

**(On the path of Mičurin).**

Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1951 : No. 5 : 22-23. [Russian].

Descriptions are given of vine varieties Severnyi [Northern] and Zarja Severa [Dawn of the North] which were bred by Mičurinites at the RSFSR Scientific Research Institute of Viticulture and Wine Making. Both varieties were obtained from a cross between Malingre and *Vitis amurensis*. They are productive, early and hardy.

Severnyi has female flowers. It yields 80 to 100 c. per ha. The grapes are black, round and of medium size. The bunches weigh 100 to 150 gm. The ripe grapes contain 18 to 22% sugar. Their flavour is good.

Zarja Severa differs little from Severnyi, except that it produces more compact bunches and its grapes are sweeter and have more crunchy flesh.

741. KUZJMIN, A. JA.

**(Breeding vines in the northern viticultural districts).**

Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 6 : 45-47. [Russian].

Several new hardy hybrid vines, including 34 élites and 2 superélites have been developed at the Mičurin Central Genetical Laboratory. Some of these vines are as early as Sejanec Malengra [Malingre Seedling] and Early Malingre and produce good quality grapes. They have been obtained from crosses between the Mičurin varieties Sejanec Malengra, Russkii Konkord [Russian Concord], Korinka Mičurina [Mičurin's Currant] and 135 on the one hand, and the early maturing southern varieties Halili, Ezandari,

Early Malingre and Muskat Vengerskii [Hungarian Muscat] on the other.

742. LUKIN L. A.

(Hardy varieties of vines).

Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 6 : 47-48. [Russian].

Several hardy varieties, reaching maturity in September and coming into bearing in their fourth year under Moscow conditions, are described. They have been developed from local material.

Rekord [Record] produces compact cylindrical bunches of round black grapes with good flavour. Ispolin [Giant] is a vigorous vine. The bunches are compact and cylindrical. The grapes are black, round, and larger than those of Rekord. Their flavour is good.

Uspeh [Success] produces compact bunches with dark red, round grapes. The grapes are large and have a Labrusca flavour.

Terrasnyĭ [Terrace] produces small bunches with round, black, small grapes of good flavour.

743. KUZNECOV, P. A.

(The Jurjevec Branch Centre of Northern Viticulture).

Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 8 : 43-44. [Russian].

Mention is made of hardy early vine hybrids 3 and 4, bred at Jurjevec, Ivanovskaja province. They resulted from crosses between early southern varieties, on the one hand, and hardy hybrids from crosses between Mičurin varieties, on the other. The latter were trained for hardiness at Jurjevec.

744. PAVLOV, P. A.

(Grapes in the Čuvaš republic).

Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 6 : p. 50. [Russian].

Several promising seedlings of Madeleine Angevine, Severnyĭ [Northern], 135, Černyĭ Sladkiĭ [Sweet Black], and Sejanec Malengra [Malingre Seedling] have been obtained in the Čuvaš republic from material from the Mičurin Central Genetical Laboratory.

Sejanec 5 [Seedling 5] was developed from Severnyĭ, a new variety bred at Mičurinsk from Sejanec Malengra x *V. amurensis*. It is hardy, vigorous and productive. The bunches are 6 cm. long and 5 cm. wide. The grapes weigh 0.6 grm. They are attached firmly to the fruit stalks, round and dark mauve, with sweet juicy flesh of the same colour.

Sejanec 7 [Seedling 7] was derived from Černyĭ Sladkiĭ. The bunches are 7 cm. by 5 cm. The grapes weigh 0.8 grm. and are round and black

with a waxy bloom. The flesh is of good flavour. The seedling is hardy and has high yielding capacity. Other promising seedlings include Nos. 1, 2, 3, 4, 6 and 22.

745. POTAPENKO, JA. I.

(The protection of vineyards against spot necrosis).

Vinodelie Vinogradarstvo SSSR (Wine-making Viticult. USSR) 1951 : No. 8 : 33-37. [Russian].

The cultivation of Chasselas, Galant, Sylvaner, and Pino Seryĭ [Grey Pinot], which are capable of developing reproductive shoots from buds at the base of the vines, is recommended in districts where spot necrosis occurs.

## FORESTRY

746.

**Report on Forest Research for the year ending March, 1950.**

Forestry Commission, London 1951 : Pp. 126.

Matthews, J. D. *Forest genetics*. (pp. 40-47).

Three methods of improvement are being used: mass selection, mother tree selection, and selection of both parents.

### Beech

Parents for the establishment of seed orchards have been selected from stands containing a high proportion of trees suitable for the veneer and furniture industries. Late flushing trees have been marked for possible use in afforestation of chalk downland; in their early growth, late flushers are less susceptible to injury by late frosts. Data so far obtained indicate that seed collected from vigorous, well-formed and well-tended plantations will yield a high proportion of vigorous one-year seedlings.

### European larch

Trees in north-east Scotland have been selected as material for an experimental seed orchard. A strain with resistance to die back is being sought. Experiments on the forcing of fruit production by means of different types of rootstocks, root pruning and manuring are to be carried out as an adjunct of breeding.

### Pinus nigra

Var. *calabrica* is the most suitable for Britain. Seed stands have been selected on four main types of site; single trees have also been marked for testing and subsequent inclusion in an experimental seed orchard. Work on the correlation of external morphological characters and inherent quality is in progress. Predominantly male or female individuals occur;



it is not yet clear whether this sexual difference is associated with any other vegetative characteristic.

### Scots pine

Mother trees have been chosen. Hybridization between trees of different provenance is to be undertaken.

### Sitka spruce

Inheritance of late flushing is being studied. Trees reported to be resistant to *Neomyzaphis* have been marked for propagation and testing.

Wood, R. F. and Pinchin, R. D. *Provenance studies*. (pp. 48-55).

Provenance studies of beech and Scots, Corsican and maritime pine are reported. The results so far obtained in the international European larch provenance experiments in Britain are also summarized.

Peace, T. R. *Forest pathology*. (pp. 76-83).

Poplars are under trial for resistance to bacterial canker. The existence of two clones of *Populus Eugenei* has been established. One clone, occurring throughout southern England, is highly susceptible to canker. The other is resistant but has so far only been discovered on two Norfolk estates and at Kew and Edinburgh Botanic Gardens.

Laing, E. V. *Botanical studies of variation in certain conifer species*. (p. 124).

Study of morphological variations in Scots pine as racial characteristics continued at the Department of Forestry, Aberdeen University. Needle dimensions and the relationship between pith and wood diameter in the current year's shoot are regarded as particularly important; variations have also been observed in colour of the male flowers, cone structure, seed, and ratio of length to breadth of wing. In Douglas fir the following characters have been found useful in determining types: arrangement and thickness of needles, continuity of hypoderm, presence or absence of papillate and stone cells, colour of male and female flowers, shape of ovuliferous scale and length of bract scale. In Sitka spruce variation in stomatal development, bark and cone has been noted.

747.

**Thirty-First Annual Report of the Forestry Commissioners for the year ending September 30th 1950 :**  
Pp. 74.

### Poplar

Clonal trials continued. Tests of varieties for canker resistance are bringing to light some promising resistant varieties.

### Beech

Strains of different provenances are under observation; vigorous strains could be differentiated in the nursery bed.

### European larch

Material from 20 élite trees has been propagated; formation of an experimental seed orchard is planned.

### Corsican pine

Seed stands have been selected and 21 single trees marked down for propagation and testing. Fairly successful methods of grafting for propagating élite material have been devised.

### Scots pine

Propagation of selected mother trees on suitable rootstocks has begun.

### Sitka spruce

Shoots of Sitka spruce have been collected from late flushing trees less liable to spring frost damage, and from trees showing relative immunity from attacks by green spruce aphid.

748.

ARNBORG, T.

Om avelsträd och skogsträdsförädling.  
(On trees for breeding purposes and forest tree breeding).

Skogen 1951 : 38 : 197-98.

This wireless talk gave a popular account of the application of plant breeding methods and genetics to forest tree breeding in Sweden.

749.

JOHNSSON, H.

Årsberättelse över Föreningens för växtförädling av skogsträd verksamhet under år 1950. (Annual report on the work of the Association for Forest Tree Breeding during the year 1950).

Årsberätt. Fören. Växtföräd. Skogsträd 1950 : 3-17.

This short report containing the following information on the work of the research stations at Ekebo, Brunsberg and Sundmo is further amplified by the articles reviewed in Absts. 756 and 774.

### Ekebo Station

Work on a large scale was continued on conifer grafting, and older grafts that had flowered were used in artificial crossings of pine and of larch. From these crosses hybrids between native and foreign pines will be obtained and also inter-specific hybrids of *Larix decidua*, *L. leptolepis* and *L. sibirica*. Some spruce crosses were also made. The number of plus trees entered in the pedigree register was increased by some pines and spruces chosen, in particular, from northern Västergötland and Östergötland and from Halland.

Hybrids of *Betula papyrifera* x *B. verrucosa* and *B. papyrifera* x *B. pubescens* are being studied, and other interesting material under observation includes (1) diploid and triploid races of *Alnus glutinosa*, and (2) clones from 17 different mother trees of ash from which seedling progenies have been obtained.

Extensive hybridization of alder, birch and aspen was carried out, including about 50 combinations of alder representing interspecific crosses and polyploid crosses to obtain triploid and tetraploid progeny from colchicine treated parent trees.

The birch crosses included hybrids of southern Swedish and Norrland *B. verrucosa* birches to be used to study the economic value of hybrids derived from parents of different provenance. Curly birch crosses were also made.

#### Brunsborg Station

Progeny tests of pine, spruce, birch, aspen and alder have been laid out. The aspen seedlings are all families from controlled crosses; the rest are mainly offspring of plus trees after natural seed setting. Most of the material was obtained from Värmland and the neighbouring regions.

The spruces also comprise some progenies derived from central European spruce grown in southern Sweden.

Aspen, pine and birch crosses were carried out and as a result 9500 plants from 13 combinations were set out in cold frames in early summer.

In crosses involving American conifers, young trees of the species *Picea Mariana*, *Pinus Banksiana* and *Pinus contorta* were used. The object here was to find out whether the foreign species were interfertile with the Swedish ones and, if so, to note whether heterosis occurred.

Regional surveys in various parts of the country resulted in the registration of 62 plus trees of pine and 3 of spruce.

Studies on fertility in spruce and pine in high lying districts were continued.

#### Sundmo Station

The first steps in the establishment of an arboretum for plus trees from the whole of Norrland have included the establishment of a collection of pine grafts from 252 selected trees. Crosses have been made within the species *Pinus sylvestris* and also between the species *P. sylvestris*, *P. Murrayana* and *P. Banksiana*.

The interspecific crosses *Populus tremula* x *P. tremuloides* and *P. tremula* x *P. grandidentata* comprised 12 crosses between American and Swedish poplars. The hybrids between the North American aspen and the best Norrland specimens are expected to be well suited for

cultivation in the most northerly parts of the country.

The spruce provenance experiments laid out in 1943 and 1944 by the Association and the Kramfors AB are to test the possibility of transferring spruces to sites from 225 to 500 metres above sea level.

750. LANGNER, W.

Unterschiede der Züchtung in Land- und Forstwirtschaft. (**Differences in breeding technique in agriculture and forestry**).

Züchter 1951 : 21 : 186-91.

Inherent differences in methods and aims between agricultural plant and forest tree breeding are reviewed, and an account is given of the various methods of approach that have been or might be tried in attempting to solve the particular problems of tree breeding.

751. SYRACH LARSEN, C.

**The possibilities of improving forest trees.**

Forestry 1951 : 24 : 19-21.

Several original methods of approaching the problems of forest improvement in Denmark are outlined. In attempts to preserve the genotypes of mature individuals with outstanding characteristics, grafts have been taken from many valuable élite specimens. When grown in a plantation these grafts become sexually mature at an early age, thus providing seed for practical purposes, helping in the problem of identifying the genotypes of many clones, testing certain desirable genotypes in different environments and investigating numerous pathological problems. Under special treatment, grafts from élite trees can become seed-bearing potted plants in the greenhouse, offering unlimited opportunities for controlled hybridization and many other research investigations.

752. LANGLET, O.

Skogsfrö. Anvisningar angående frötäkt och handel med skogsodlingsmaterial. (**Forest tree seed. Regulations concerning seed collection and trade in silvicultural material**).

Skogen 1951 : 38 : 26-30.

The regulations in Sweden for promoting the collection of high grade seed from forest stands, chosen for their probable high quality, are explained and discussed with brief comments on the role of inheritance in the transmission of desirable types to the progeny.



753. GRAVES, A. H.

**Blight resistance in the chestnut.**

Plants and Gardens 1951 : 7 : 138-39.

The work of interspecific hybridization to develop trees with resistance to *Endothia parasitica*, carried out during 1930-47 at the Brooklyn Botanic Garden and since 1947 at the Connecticut Agricultural Experiment Station, is briefly described. Mention is made of the correlation between the occurrence of certain tannins in the bark and the degree of resistance to the fungus.

754. REX, E. G.

**Oak wilt.**

Phytopathology 1951 : 41 : p. 659. (Abst.).

A survey of the distribution of oak wilt, *Chalara quercina*, in the United States has revealed that no species of *Quercus* is immune; members of the white oak group are more resistant than those of the black group.

755. SCHREINER, E. J.

**Breeding poplars for disease resistance.**

Plants and Gardens 1951 : 7 : 140-43.

Numerous fertile interspecific hybrids developed in 1924 and 1926 by the New York Botanical Garden and the Oxford Paper Company showed such wide variability with respect to disease resistance that they have been the principal source of material for breeding and vegetative propagation to increase resistance to all major diseases. The work of the Northeastern Forest Experiment Station in crossing selected individuals of native species with superior hybrids is briefly described.

756. JOHNSON, H.

**Avkommer av masurbjörk. (Offspring of curly birch).**

Årsberätt. Fören. Växtföräd. Skogs-träd 1950 18-29.

A large collection of curly birches from Uppland, Värmland and Småland in Sweden have been under observation as part of a study of the cause of the curly grain, and plantings of offspring from natural and artificial crosses have been made.

It now appears clear that the typical wavy grain is conditioned by a hereditary disturbance in the function of the cambium.

Seed from curly birches in natural stands have sometimes shown a high percentage of curly trees in their progeny, but this proportion may be affected by extraneous conditions.

In controlled crosses between curly birches the progeny show a high frequency of curly trees, though not 100%. Further experiments will probably show that uniform progeny can be obtained.

757. SCHRÖCK, O.

**Stimulierende Wirkung des Colchicins bei der Keimung und dem Wachstum der Sämlinge. (Stimulatory action of colchicine in germination and the growth of seedlings).**

Züchter 1951 : 21 : 142-49.

Batches of 100 birch seeds were soaked in a 0.2% solution of colchicine for 24 hours and 48 hours, the controls being treated with water. Results showed that the energy (rate) of germination of freshly gathered seeds was reduced by colchicine, but the germination capacity was unaffected. Seeds stored for three months were unaffected by the colchicine treatment, but seeds exhibiting a decreased rate of germination after storing for five months showed an increase in rate of germination after treatment, without, however, any rise in germination capacity; this effect was greater in the case of the longer period of treatment. The growth rate of the seedlings was similarly increased and this was still evident even after 18 months. Comparison of his results with those of McLintock on direct seeding of pines and of Johnson on chemical treatment of seeds leads the author to the conclusion that treatment with colchicine, as above described, causes activation of the enzymes in resting birch seeds.

758. BAKER, W. L. and

MAY, C.

**Phloem necrosis of elm.**

Plants and Gardens 1951 : 7 : 129-30.

Some seedlings with a high degree of resistance to the phloem necrosis virus have been obtained from the few American elms showing resistance to this disease.

759. PRYOR, L. D.

**Some hybrids of *Eucalyptus viminalis*.**

Aust. For. 1950 : 14 : 95-98.

Hybrids of *E. viminalis* with *E. Bridgesiana*, *E. cinerea* and *E. rubida* are described to illustrate the ease with which the parents of an individual can be determined, shortly after germination, owing to distinctive characteristics of the juvenile foliage.

The three crosses produce progeny indicating three separate forms of segregation occurring in the field. *E. viminalis* x *E. Bridgesiana* produces

a hybrid swarm in which all combinations of characters from each parent are found. The progeny of *E. viminalis* x *E. cinerea* closely resemble one or other parent, as intermediate combinations are not apparently viable. The third cross, *E. viminalis* x *E. rubida*, produces progeny of an intermediate type only.

It is hoped that these observations will facilitate the taxonomic review of the genus which is being undertaken. Hybridization between species of more distantly related groups is probable but as yet unobserved.

760. GUINIER, P.  
Deux formes affines d'alisiers: *Sorbus latifolia* Pers. et *S. confusa* Gremli.  
(Two related forms of *Sorbus*: *S. latifolia* Pers. and *S. confusa* Gremli).  
Bull. Soc. Bot. Fr. 1951 : 98 : 86-88.

Results from a comparative study of the above two species suggest that *S. latifolia* is a balanced structural hybrid, due possibly to tetraploidy or some such mechanism.

761. ROBERTS, A. N. and  
BOLLER, C. A.  
Holly production in Oregon.  
Sta. Bull. Ore. Agric. Exp. Sta. 1948 :  
No. 455 : Pp. 32.

The characteristics of numerous varieties of *Ilex aquifolium* are briefly described with reference to commercial requirements. Mention is made of the collection and study of varieties in progress at the Oregon Agricultural Experiment Station, and the programme of selection which is being undertaken to obtain trees bearing large crops of early maturing berries of desirable quality.

762. DE POUQUES, M. -L.  
Étude chromosomique des *Sorbus latifolia* Pers. et *Sorbus confusa* Gremli.  
(A chromosome study of the species *S. latifolia* Pers. and *S. confusa* Gremli).  
Bull. Soc. Bot. Fr. 1951 : 98 : 89-92.

In order to test Guinier's hypothesis (cf. Abst. 760) regarding tetraploidy in *S. latifolia* the writer made a study of the chromosomes in that species and in the hybrid *S. confusa* and its parent forms *S. Aria* and *S. Torminalis*. The results did not bear out the hypothesis of tetraploidy. The chromosome number was  $2n = 34$  for all four species and the cytological structure of the two hybrids *S. confusa* and *S. latifolia* was intermediate between that of the two parent species, as was also the case with regard to their anatomical features. Some

metaphase plates with over 50 chromosomes were, however, noted in *S. latifolia*, and it is therefore possible that some 68-chromosome cells might be occasionally found, which would suggest that polysomaty might occur in this species.

763. ATCHISON, E.  
Studies in the Leguminosae. VI.  
Chromosome numbers among tropical woody species.  
Amer. J. Bot. 1951 : 38 : 538-46.

The high degree of uniformity noted during an analysis of chromosome numbers in 114 species of tropical woody genera belonging to the Leguminosae is attributed to a decrease in mutation rate at high temperatures and the barrier to hybridization provided by cleistogamy. No cytological evidence was obtained for the derivation of low numbered members of the Caesalpinoideae and Papilionatae from the Mimosoideae, most of which have fairly high numbers. It is probable that all three sub-families arose from similar ancestral prototypes. Chromosome numbers indicate that woody types are of earlier origin than herbaceous legumes, but the numbers alone cannot support the hypothesis of evolution of either growth form from the other.

764. TOOLE, E. R.  
Mimosa wilt.  
Plants and Gardens 1951 : 7 : 144-45.  
Resistance tests with *Albizia julibrissin* in the USA have resulted in selection of a few trees with a high degree of resistance to *Fusarium oxysporum* f. *perniciosum*. This stock is being increased vegetatively as seedlings were not uniformly resistant.

765. HADDERS, G.  
Norrländska plustallar. (Norrländ plus pines).  
Skogen 1951 : 38 : 120-21.

The various parts of Norrland, Sweden, are enumerated where pines have been selected for their good phenotypes as suitable for registration and seed production. Illustrations and graphs show the methods followed in making use of such trees to provide good seed or clones for planting.

766.  
Kromosomgransådd. (Chromosome spruce seed).  
Skogen 1951 : 38 : p. 77.

The first experiments in Sweden, with seed from "chromosome treated" pine and spruce have been started in the parish of Haverö.



767. HERRMANN, S.  
Im Primärstadium blühende Kiefer.  
(A pine flowering in the primary stage of development).  
Naturwissenschaften 1951 : 38 : 381-82.

A scion from a seedling of *Pinus montana*, grafted on a seedling stock of *Picea excelsa*, produced a normal male flower with normal pollen after 16 months. In the instances of premature flowering so far reported, the female flower has been the first to appear.

768. PAWSEY, C. K.  
**Some observations upon the vegetative reproduction of Monterey pine.**  
Aust. For. 1950 : 14 : 90-94.

Information regarding the heritability of desirable characters in species propagated vegetatively has been obtained at Mount Burr research station, South Australia. The third generation of vegetatively propagated progeny obtained from selected trees of *Pinus radiata* resembles the original cuttings with respect to rooting capacity and general vigour.

769. SCOTT, M. H. and  
DU PLESSIS, C. P.  
**The qualities of the wood of *Pinus Taeda* grown in South Africa.**  
J. S. Afr. For. Ass. 1951 : No. 20 : 19-30.

Data concerning the seasoning quality, weight and strength of *P. Taeda* timber have shown that variations are as common as in other locally grown pines; a comparison is made with *P. patula*, *P. insignis* and *P. Pinaster*.

770. LOOCK, E. E. M.  
**The pines of Mexico and British Honduras.**  
Bull. Dep. For. S. Afr. 1947 : No. 35 : Pp. 244.

Chapter V deals with the classification of pines growing in Mexico and British Honduras. In Chapter VI *Pinus* species introduced from these two countries and recommended for South Africa are listed, with notes on their performance.

771. KIELLANDER, C. L.  
Jämförelse mellan svensk och mellan-europeisk gran i sydsvenska försöksodlingar.' (Comparison between Swedish and central European spruce in experimental plantations in southern Sweden).  
Skogen 1951 : 38 : 118-19.

In investigations still in progress in various parts

of Sweden, including Ekebo, the German spruce has proved superior in growth increase and timber quality to the Swedish spruce, and also, owing to its late shooting in the spring, it has remained free from injury by the night frosts that have extensively damaged the Swedish spruce. Field experiments have, however, also revealed that some specimens of Swedish spruce in certain localities are genotypically fast-growing types and especially late in shooting and therefore particularly resistant to spring frosts.

In considering the range and limits of cultivation of the German spruces in Sweden, it is suggested that central European spruce from countries such as Poland and Rumania might be used, instead of German spruce, for any replacements in southern Swedish spruce stands when seed becomes available.

The southern Swedish spruce should also prove a valuable source of seed in the future for parts of Sweden beyond the northern limit for the German spruce, and could also be grown in combination with the best phenotypes that may be discovered in such outlying localities.

772. DAY, W. R.  
**The susceptibility to injury by experimental freezing of strains of European larch (*Larix decidua* Mill.) of varying geographical origin.**  
Forestry 1951 : 24 : 39-56.

Data are presented concerning the effects of artificially induced low temperatures on strains of *L. decidua* obtained from European and Scandinavian countries. Each strain was subjected to three different temperatures in each of the three months, March, April and May, during which most frost damage normally occurs in Great Britain. Considerable variability was observed in the degree of susceptibility of strains from different geographical regions and of strains from different localities within one geographical region. Swedish and Czechoslovakian strains were most resistant.

Results suggest that trees raised from seed from northern latitudes are less susceptible to frost injury than those from more southern parts. It also appears probable that, at any given latitude, larches raised from seed from low elevations are more likely to be frost resistant than those from higher latitudes. If further studies of variability were carried out on a much larger scale it is expected that results would make possible the selection of strains suitable for growing in Great Britain.

773. ROHMEDEK, E.  
Die Vererbung der Austreibzeit bei Fichteneinzelstämmen. (**The inheritance of shooting time in single trees of spruce**).  
Forstwiss. Zbl. 1948 : 67 : 32-38.

The time at which the buds opened was recorded in 60 individuals in a 58 year old stand. There was an interval of 13-15 days between the earliest and latest trees and the order in which the trees flushed remained the same in five different years of observation. The progenies of the early-shooting trees flushed in general earlier than those of the later ones, though their order did not correspond precisely with that of the mother tree.

There was no difference in growth rate between early and late shooting trees, and it should therefore be possible to select good trees that shoot late and so escape spring frosts; such trees are also less damaged by *Lymantria monacha*.

774. KIELLANDER, C. L.  
Sortskillnader i 10-åriga fältförsök med svensk och mellaneuropeisk gran. (**Varietal differences in 10-year field trials with Swedish and central European spruce**).  
Årsberätt. Fören. Växtföräd. Skogsträd 1950 : 30-49.

This is a more elaborate report and discussion on the study already summarized in Abst. 771.

## VEGETABLES

775. DAWSON, C. D. R.  
**Plant breeding in vegetable seed production**.  
Sci. Hort. 1950-51 : 10 : 134-43.

A general account is given of vegetable breeding in England, including introduction of foreign varieties, controlled crossing, progeny testing and selection.

776. MOELLER [MELER], S.  
**[The cultivation of non-irrigated vegetables (cont.)]**.  
Hassadeh 1951 : 31 : 155-58. [Hebrew].

The following varieties are under investigation at the Israeli settlement of Hekhotrim.

### Shallots

The varieties Turkish and Cypriot were successfully grown under arid conditions. Hamekomi, the local variety, is being planted for seed production.

### Onion

Varieties which did well under nonirrigated conditions included Early Spanish, Early Grano and Golden Babuza.

### Lettuce

Varieties Attraction, Golden Head, Kazrad, Rinat Hakfar [Joy of the Village] and Erfurt did well.

777. READ, F. M.  
**Contributions of agricultural research in crops.—4. Vegetables**.  
J. Aust. Inst. Agric. Sci. 1951 : 17 : 83-84.

Progress made during the last half century in the selection of vegetable varieties suited to Australia is reviewed. Mention is made of the influence of the second world war in promoting a more active breeding programme.

778. ZWICKY, H.  
L'origine de nos plantes potagères. (**The origin of our kitchen garden plants**).  
Rev. Hort., Suisse 1951 : 24 : 173-77, 233-35.

Brief notes are given on the early history and the country of origin of the following plants, among others, with observations on the period at which they were first introduced into cultivation: cabbage, kohlrabi, turnip, colza, radish, garden cress, peas, lentils, broad bean, kidney bean, *Dolichos Lablab*, lettuce, chicory, endive, cardoon, horseradish, artichoke, *Scorzonera*, salsify, spinach, beet, carrot, celery, parsley, fennel, valerian, rhubarb, maize and soya bean.

779. BOOTH, V. H.  
**Distribution of carotenoids in different parts of the carrot**.  
J. Sci. Food Agric. 1951 : 2 : 350-53.

Distribution of carotenoids was analysed in fresh roots of several varieties and selections.

780. CARLSSON, G.  
Något om förädlingsarbetet med vinterrädisor i Hammenhög. (**On the breeding work with winter radishes at Hammenhög**).  
Medd. Gulläkers VäxtförädlAnst., Hammenhög 1949 : No. 3-4 : 47-55.

Breeding for suitability to winter cultivation at Hammenhög has been carried out under conditions of short day, low intensity of illumination and low temperature. The programme has included (a) further breeding of Hammenhög winter selections of the ordinary forcing varieties to obtain strains for growing in winter; and (b)



the production of entirely new varieties by hybridization.

The first winter radish in Sweden, Hammenhög's Vinter [Hammenhög Winter] was bred at Hammenhög and put on the market in 1942, but it has been surpassed by the Hammenhög's Vinter strain which was obtained in 1948 after constant selection and is considerably more suitable as a winter radish than the ordinary forcing types.

781. ULLMAN, H.  
[**Growing onions and onion seed.**  
(Concl.)].

Hassadeh 1951 : 31 : 436-38 [Hebrew].

In this conclusion, a survey of all the onion varieties grown in Israel is made. There are no true native varieties, the nearest approach being the varieties Maoi and Egyptian. In 1934-35, several varieties were introduced from the USA. A recent introduction is the small onion Brown Australian, which is proving to be a good keeper. The *Allium fistulosum* variety He-she-ko is being grown at Acre.

782. TEREHOV, P. F.  
[**New varieties of onion producing bulbs in one year.**]

Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 6 : 58-59. [Russian].

As a result of trials, Odnoletnii Gribovskii [Gribovo Annual] has been made a standard in several central provinces of the USSR; Odnoletnii Sibirskii [Siberian Annual] in several Siberian and Far Eastern provinces; and Odnoletnii Havskii [Havskii Annual] in the woody steppe zone of European Russia. The varieties were bred at the Gribovo, West Siberian and Verhne-Havskaja Breeding Stations respectively. All three are capable of producing marketable bulbs in the first year.

783. RASCH, E. M.  
[**Nuclear and cell division in *Allium cepa* as influenced by slow neutrons and X-rays.**]  
Bot. Gaz. 1951 : 112 : 331-48.

Marked growth retardation was noted in bulbs of *A. Cepa* after irradiation with X ray doses of 100 r, 1000 r and 10,000 r or with  $5.8 \times 10^{10}$  slow neutrons per sq. cm. per sec. for periods of 2, 4, 8 or 16 mins. All slow neutron treatments and the 10,000 r X ray dose proved to be lethal; death occurred within 15 weeks.

Cytological responses to both types of irradiation, observed in cells of root tips collected 48,

52 and 96 hours later, occurred in the following sequence: temporary inhibition of mitosis; abnormal nuclear division caused by all types of chromosomal aberrations; abnormal cell division; and finally, degeneration of nuclei and cells which were severely damaged by the original treatment or had suffered subsequent disorientation.

Nuclear pycnosis was common at high doses of both forms of irradiation, otherwise the type of aberration, whether dicentric, centric or acentric rings, fragments or deletions, was unrelated to the dosage or treatment. Aberration frequency was directly related to the magnitude of the dose. The apparently small number of aberrant cells, including those with a structurally abnormal anaphase, pseudoamitotic nuclei and cells possessing one or more micronuclei, at the highest dosages can be correlated with correspondingly lower rates of division resulting from severe treatment. A saturation effect may be attributed to the difficulty of counting all affected cells, particularly those experiencing mitotic inhibition. A measurement of aberration frequency alone, therefore, does not give a valid interpretation of the effects of irradiation.

784. BERGER, C. A. and  
WITKUS, E. R.  
[**Some cytological effects of cortisone.**]  
Bull. Torrey Bot. Cl. 1951 : 78 : 422-25.

Cytological observations made after treating root tip cells of *Allium Cepa* with cortisone indicate a retardation of mitosis with increased contraction of chromosomes, the occurrence of abnormal anaphases in a few meristematic cells resulting in incomplete nuclear division or binucleate cells, and numerous localized areas of tetraploid mitoses. Tetraploidy appears to have arisen, not by c-mitosis or other spindle abnormalities, but by "induction of a double chromosome reproduction in resting nuclei."

785. JONES, H. A. and  
PERRY, B. A.  
[**Hybrids may cause boom in new silver and gold onions.**]

Sth. Seedsman 1951 : 14 : No. 9 : 21, 61.

A popular account of work on the production of  $F_1$  hybrid onions in the USA is given. Among the high yielding hybrids which will shortly be available for commercial use in the southern states are Granex (male sterile line of Excel x inbred from Texas Early Grano 502), a mild yellow onion, and L 690 x CC 163, a white mild onion with a shape typical of Crystal Wax.

Further new hybrids are under observation at Crystal City, Tex.; among these the three-way hybrid (L 690 x CC 163) x L 327 and combinations between Excel and San Joaquin show particular promise.

786. SKILES, R. L.  
**The fungi causing purple blotch of onions.**

J. Colo. Wyo. Acad. Sci. 1950 : 4 : No. 2 : 59-60.

*Alternaria Porri* was more pathogenic than either *A. tenuis* or *A. tenuissima* on five onion varieties grown in Colorado.

787.  
Alho imune à "ferrugem" e resistente ao armazenamento. (**Garlic immune to rust and resistant to storing**).  
Bol. Minist. Agric., Brasil 1947 : 36 : Nos. 1-3 : p. 67.

The Brazilian garlic Caiano Roxo has proved quite free from rust attack and is capable of being stored for 9 months without deterioration. Selection with this variety is in progress at the Instituto Agrônômico at Campinas.

788. BATEMAN, A. J.  
**The taxonomic discrimination of bees.**  
Heredity 1951 : 5 : 271-78.

Observations made at the John Innes Horticultural Institution concerning bees foraging on a randomized plot of equal numbers of two varieties of *Brassica oleracea* and two of *B. Napus* showed that while hive bees visit both species with equal frequency, bumble bees visit only *B. oleracea* and solitary bees confine their visits to *B. Napus*. The constancy of bumble bees and solitary bees, with respect to one variety, is weaker than that of hive bees. The discrimination between varieties is of evolutionary significance, since it shows that normal intraspecific variation acts as a stimulus to isolation by affecting the pollinating activity of bees.

789. BAIN, D. C.  
**Observations on resistance to black rot in cabbage.**  
Plant Dis. Reporter 1951 : 35 : 200-04. (Mimeographed).

Seedlings of more than 50 cabbage varieties grown at Crystal Springs, Miss. from seed pre-soaked in a culture of *Xanthomonas campestris* have shown differences in degree of susceptibility to black rot. The differences were

correlated with rate of germination; varieties showing resistance germinated 2-5 days later than those which proved susceptible. Symptoms of black rot appeared later in many varieties with resistant seedlings but some plants maintained a high degree of resistance until maturity; the latter have been selected for further tests.

790. GANTE, TH.  
Hernieresistenz bei Weisskohl. I. (**Club root resistance in white cabbage. I.**)  
Z. Pflanzenz. 1951 : 30 : 188-97.

Investigations showed that two local varieties of white cabbage, Böhmerwaldkohl [Bohemian Forest cabbage] and Bindsachsener, from Hesse, exhibit resistance to club root. Another local variety, Mühlviertler, from the northwestern part of Upper Austria, resembled Böhmerwaldkohl in appearance and also showed some resistance to club root.

791. CARLSSON, G.  
Försök med drivsallat Early French Frame 1/48. (**Trials with the Early French Frame forcing lettuce**).  
Medd. Gulläkers VäxtförädlAnst., Hammenhög 1949 : No. 3-4 : 71-73.

This lettuce is a line selection with black seeds and a large yellowish green head and superior to Early French Frame II in aptitude for forcing and the finer quality of leaves. It has been graded as first class in official trials.

792. TOMETORP, G. and HINTZE, S.  
Klassificerande försök med drivpersilja och vinterdrivrädisa 1947-1950. (**Classifying trials with forcing parsley and winter forcing radish, 1947-1950**).  
Medd. Stat. Trädgårdsförsök 1950 : No. 60 : Pp. 14.

In continuation of the trials previously recorded in part (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 1393) and now completed, the Swedish comparative tests of strains and varieties of parsley and radishes for forcing are described. The following have been adjudged first class: the parsley variety Extra-mosskrusig GeF/50 [Extra Moss-curved GeF/50], as a parsley for forcing and field cultivation; and Extra mosskrusig driv OJO/50 [Extra Moss-curved Forcing OJO/50], for forcing only.

The winter radishes, whose origin and characteristics are described, include Rubin vinter OJO/50



[Ruby Winter OJO/50], Klenod OE/50 [Jewel OE/50] and Saxa vinter OE/50 [Saxa Winter OE/50], all three of which were judged first class.

793. MILELLA, A.  
Prove di adattamento della cicoria Catalogna nel Napoletano. (**Experiments on the adaptation of Catalanian chicory to the Naples district**). Riv. Ortoflorofrutticolt. Ital., Firenze 1951 : 35 : 159-64.

Having discussed the history and botanical status of chicory, the author records experiments which demonstrated the effectiveness, within the short period 1945 to 1950, of selection for high yield, earliness and quality in the variety Catalogna [Catalonian]. Earliness was a necessary characteristic to ensure adaptation to cultivation in the vicinity of Naples.

794. WHITAKER, T. W.  
**A smear technic for the Cucurbitaceae.**  
Stain Tech. 1950 : 25 : 133-36.

Staminate buds are fixed for 12 to 24 hours in a mixture of 3 parts of 100% ethyl alcohol and 1 part acetocarmine to which a small quantity of iron acetate has been added. The material is then rinsed in 100% alcohol. A drop of acetocarmine diluted to one-half strength with 45% glacial acetic acid is added to the anthers, dissected out on a slide. The anthers are macerated and smeared.

795. KUMAR, L. S. S. and VISHVESHWARA, S.  
**Chromosome numbers of some wild cucurbits.**  
Curr. Sci. 1951 : 20 : 211-12.

Chromosome numbers of seven wild species of *Melothria* occurring in Bombay state are reported as follows: *M. japonica*,  $2n = 22$ ; *M. maderaspatana*,  $2n = 22 +$  one or two fragments; *M. scabra*, *M. leiosperma* and *M. punctata*,  $2n = 24$ ; and *M. heterophylla* and *M. perpusilla*,  $2n = 48$ .

796. **New cantaloupe to be mildew-resistant.**

Sth. Seedsman 1951 : 14 : No. 9 : p. 34.

Mention is made of a new cantaloupe variety, resistant to both downy and powdery mildew, which has been developed at the Georgia Experiment Station; its commercial release is expected in 1953. In breeding in Georgia and

other southeastern states use has been made of wild cantaloupes as sources of disease resistance.

797. GALKA, A. T.  
(**The inheritance of characters in water melons and melons after pollination with pollen mixtures**). Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 11 : 69-71. [Russian].

Investigations of multiparental cross pollination in cucurbits support earlier evidence, obtained in Soviet experiments with cereals and tomatoes, that more than one male parental form may be involved in fertilization of the egg cell of a female variety.

The results of analyses of the  $F_1$  and  $F_2$  from the following crosses of melons with pollen mixtures are tabulated: Kolhoznica [Collective Farmer] x (Kolhoznica + Krasavica Vostoka [Beauty of the East]), Kolhoznica x (Kolhoznica + Sorokadneva [Forty Day] + Ič-Kzyl [Red Flesh]), and Kolhoznica x (Kolhoznica + Sorokadneva + Ič-Kzyl + Krasavica Vostoka).

Similar tables show the inheritance of characters in the  $F_1$  and  $F_2$  from the following water melon crosses: Muraška [Ant] x (Muraška + Krymskii Pobeditelj [Crimean Victor]), Muraška x (Muraška + Krymskii Pobeditelj + Birjučekutskii 775 [Birjučii Kut 775]), and Muraška x (Muraška + Krymskii Pobeditelj + Birjučekutskii 775 + Melitopoljskii 60 [Melitopolj 60]).

798. YAMANE, Y.  
(**Chromosome numbers in Cucurbita**). Seiken Jiho (Biological Report) 1950 : No. 4 : 72-81. [Japanese].

Japanese varieties of *C. moschata*, *C. maxima*, *C. Pepo* and *C. maxima* x *C. moschata* were investigated cytologically. All had  $2n = 40$  chromosomes and regular meiosis.

799. SINGH, R. N.  
**Studies in the floral biology of *Trichosanthes* Linn.**  
Indian J. Hort. 1950 : 7 : No. 1 : 1-13.

Studies in *T. anguina*, *T. dioica* and *T. cucumerina* on the following characters are reported: structure of flower and inflorescence; development of flower buds; dehiscence of anthers; pollen morphology and longevity; stigma receptivity; cross pollination by insects; time of fertilization; behaviour of flowers with regard to full blooming, closure and dropping; sex ratios; and fruiting.

800. ALEKSANDROV, S. V. and JAKOBSON, JU. G.  
(**New high yielding varieties of cucumbers for hot frames and green-houses**).

Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 5 : 45-49. [Russian].

As a result of trials at the USSR Institute of Plant Industry in Leningrad, several varieties of cucumbers remarkable for their high yielding capacity, earliness and good flavour are recommended for culture under cover.

The varieties are described.

801. TJALLINGH, F.  
Problemen bij het kweken van een augurkenras ongevoelig voor mozaiek-ziekte. (**Problems of breeding gherkins immune to mosaic**).  
Studiekring voor Plantenveredeling (Plant Breeding Study Circle) 19 January 1950, Wageningen 306-15. (Mimeographed).

There are many carriers of the virus that cause this disease and plants are infected each year from without. All the Dutch and French, most German and a number of Russian varieties are very susceptible. The Japanese climbing cucumber is practically immune. Tokyo, Chinese Long and China received from America are completely tolerant.

Parthenocarpic fruits are rare and the flowers must be pollinated. The plant is self and cross fertile and does not suffer from inbreeding. Artificial pollination may give 70-80% success, but less in a hot summer.

Desiderata for breeding are discussed, as are the special difficulties with regard to mosaic, such as the dependence of the symptoms on the weather. The progress of the work and methods of breeding in Holland are described, and a plan of inheritance of resistance is postulated which differs from that put forward by the Americans.

802. WILSON, J. D.  
**Ohio MR 17. A new mosaic-tolerant pickling cucumber.**

Res. Circ. Ohio Agric. Exp. Sta. 1951 : No. 10. Pp. 8.

Ohio MR 17 has been released by the Ohio Agricultural Experiment Station and should be available for general use in 1952. It was developed from mosaic tolerant progeny among the  $F_2$  of a cross between Early Russian and Chinese Long. These mosaic tolerant plants were crossed with National and back-crossed twice to this variety. A selection made in the

$F_1$  of the last back cross was named Ohio MR 17. The new cucumber, which is a good pickling variety, outyields National, has a vigorous darker green vine and produces longer fruits which are also a darker green until they become yellowish mahogany in colour at maturity. Under conditions of heavy mosaic infection, when National vines are partially dead, Ohio MR 17 is comparatively healthy and only 43% of the fruits show slight mottling.

803. SOOST, R. K.  
**Comparative cytology and genetics of asynaptic mutants in *Lycopersicon esculentum* Mill.**

Genetics 1951 : 36 : 410-34.

Sterility in five mutants of the tomato San Marzano was found to be due to asynapsis, probably determined in each case by a single recessive gene. The genes for asynapsis proved to be nonallelic and have been respectively designated  $as_1$ ,  $as_2$ ,  $as_3$ ,  $as_4$  and  $as_5$ . The mutants did not differ from normal plants in measurements of the anthers or other floral parts. Detailed study of meiosis in the pollen mother cells of the mutants  $as_1$  and  $as_4$  revealed the occurrence of variable frequencies of pairing at pachytene, diakinesis and metaphase. Both mutants showed less pairing than normal plants. The data suggested that temperature affected the amount of asynapsis. Chiasmata frequency, determined at diakinesis, was also variable in the mutants  $as_1$  and  $as_4$ , and lower than in normal pollen mother cells. Mutant  $as_4$  exhibited lower frequencies of pairing and chiasmata formation than  $as_1$ . The irregular distribution and division of the univalents at anaphases I and II resulted in the production of micronuclei and aborted pollen. No evidence of any significant effect of the genes  $as_1$  and  $as_4$  upon genetic crossing-over was secured.

804. LUGOVKIN, V. D.  
**(The cultivation of tomatoes in the zones supplying raw produce for the processing industry).**

Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 4 : 53-55. [Russian].

Several productive varieties of tomatoes, suitable for processing have been recently developed at the branch breeding stations of the USSR Scientific Research Institute of Processing Industry. These include Majak [Lighthouse], Pervenec [First Born], Černomorec [Black Sea Littoral], Kubanj, Krasnodarec [Krasnodar], Tamanec [Taman], Rybka [Little Fish] and Anaid.



## 805. CARLSSON, G.

Nio års försök med tomatorterna Potentat, Carrick och Selandia. (**Nine years of trials with the tomato varieties Potentat, Carrick and Selandia**).

Medd. Gullåkers VäxtförädlAnst., Hammenhög 1950 : No. 5-6 : 103-07.

In these trials at Gullåker (Sweden) Carrick proved superior in total yield and earliness to the other two varieties, though it requires good conditions of cultivation to ensure that there shall not be too many small fruits. Selandia and Potentat [Potentate] were superior in disease resistance.

## 806. JURIN, V. P.

(**Grafting *Solanum Dulcamara* on the tomato Budennovka**).

Agrobiologija (Agrobiology) 1951 : No. 1 : 175-77. [Russian].

Promising breeding material, obtained by vegetative rapprochement in the Moscow province, is described. *S. Dulcamara* produced larger leaves and inflorescences when grafted on Budennovka [Budennyi]. Three fruits containing seed were picked from the stock. The seed of the first two gave plants resembling Budennovka. A single fruit harvested later has given a first generation with earlier maturing fruits and a habit different from that of Budennovka, though with normal-sized fruits. The second seed generation gave 11 plants showing considerable morphological differences. One plant had small smooth red fruits reaching maturity early; another plant was more vigorous and produced more and larger fruits.

## 807. SAGAĬDAK, I. M.

(**Grafted inflorescences**).

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 11 : 46-50. [Russian].

In experiments at the USSR Institute of Breeding and Genetics, inflorescences of the tomato Albino were grafted as scions on Humbert tomato stocks. One graft developed normally and produced four fruits, all of which were red, round, and bilocular as in Humbert. The fruits weighed 73 gm. each and yielded 315 seeds. Inflorescences of two other experimental plants developed roots and leaves, which were continuously removed to increase the influence of the stock. These plants formed inflorescences at a later stage. Most fruits produced were white and had the same number of locules as Albino, but one fruit upon each of these plants was white with faint pink stripes. These fruits grew at the lower ends of the scions.

Three white fruits and a pink striped white fruit were harvested. They weighed 136 gm. and yielded 327 seeds. The seed of all fruits mentioned above was planted, the seed of the red fruits separately from that of the white and pink striped fruits.

The first generation of the vegetative hybrid with red fruits gave plants having a semi-determinate or a prostrate habit; plants with simple inflorescences, with some simple and some compound inflorescences, and a few with compound inflorescences. The fruits differed in respect of shape, some being round, while others were ribbed or plum-shaped. Only four fruits were white, most fruits being red, while some were yellow or raspberry-coloured.

The first generation of the vegetative hybrids with white or pink-striped fruits were more uniform regarding growth habit, which was characteristic of Albino. Most fruits resembled those of Albino although some were red and others differed in shape.

The results of chemical analyses of the fruits of the vegetative hybrids and the controls are reported.

## 808. BARTON, D. W.

(**Localized chiasmata in the differentiated chromosomes of the tomato**).

Genetics 1951 : 36 : 374-81.

The following data are presented in support of the conclusion that chiasma formation and crossing-over in the tomato are restricted to the achromatic regions of the chromosomes: (1) in a reciprocal translocation between chromosome 2 and chromosome 12, no chiasmata were observed at prometaphase in the completely chromatic short arm of chromosome 2; (2) at diakinesis no chiasmata were found in the chromatic regions of either the long or short arm of chromosome 1; and (3) no evidence of crossing over in the chromatic short arm of chromosome 2 was obtained, using differences in the length of the satellite on the short arm of this chromosome as a means of analysis. Total linkage within chromatic regions, it is suggested, is a means by which large blocks of hereditary material may be transmitted without recombination.

## 809. MORGANDO, A.

Osservazioni sulla infiorescenza del pomodoro: *Solanum Lycopersicum* L. [**Observations on the inflorescence of the tomato (*S. Lycopersicum* L.)**].

Nuovo G. Bot. Ital. 1948 : 55 : 347-57.

A detailed comparative account is given of the morphology of the inflorescence and the floral

biology of the Italian varieties Ingegnoli gigante liscio [Giant Smooth Ingegnoli], Rosso Grosso di Genova [Genoa Large Red], Pilastro [Pillar], Pancrazio and Prospero.

810. ALEKSEENKO, JU. K.

**(Cross pollination of tomatoes and production of hybrid seed without emasculating the flowers).**

Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 11 : 37-40. [Russian].

The results of investigations at Maikop of heterostyly in 21 varieties of tomatoes are reported. It was found that the stigmas in the flowers of most varieties cultivated in the northern districts did not extend as far as the stamens. The stigmas in the flowers of southern tomatoes, on the other hand, sometimes reached the stamens and sometimes extended beyond them. A southern variety, Mikado 34/4, developed fewer flowers with the stigmas extending beyond the stamens, when grown for a single season under Moscow conditions.

In experiments conducted in the Moscow province two heterostylous varieties, Mikado 34/4 and Matador Štambovyi 1731 [Determinate Matador 1731], were pollinated with Bison 1586. The operation of emasculation was omitted in both instances. The seed of every fruit was planted separately. Analyses of the material showed that it segregated in the F<sub>1</sub>. Reference is made to heterotic effects observed in some hybrids from Matador Štambovyi 1731 x Bison 1586.

Extensive use in intravarietal and intervarietal hybridization of the best heterostylous varieties is advocated.

811.

**(Bulletin of the Vegetable Growers' Association).**

Hassadeh 1951 : 31 : 160-64. [Hebrew].

Attempts are being made to find a suitable tomato for processing ; a dry matter content of 7-8% is aimed at. The varieties Pearson and Early Z. Taham had the highest dry matter contents. Varieties Tatura and Gordon-Sateet have also done well.

812. TULŽENKOVA, F. F.

**(An outstanding experiment in producing high yields of vegetable crops under screens in the extreme north).**

Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 7 : 54-58. [Russian].

Remarkable biological and morphological changes occurred in the tomato varieties Break

o' Day, Budennovka [Budennyi], Bison and Nahodka after several years' cultivation under the conditions of the Komi ASSR. Of the above varieties Nahodka is the earliest and most productive.

On a collective farm in the Priuraljskii district, the varieties Bison and Budennovka were improved by continued selection. The changes include greater earliness in Budennovka.

813. SUKORCEVA, K. D. and

KRIVINA, V. G.

**(Cooperation between science and industry).**

Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 4 : 49-53. [Russian].

A recently developed mid-season determinate tomato variety, Tamanec [Tamanj], gave a good account of itself in varietal trials conducted in the Grozno province and Northern Osetia and Kabardo. It showed resistance to big bud and fungus diseases and produced good quality fruits with a high content of solids.

Reference is made to a productive determinate variety Krasnodarec [Krasnodar], unfortunately susceptible to a bacterial disease, and to the early varieties Majak [Lighthouse], Pervenec [First Born], Černomorec [Black Sea Littoral] and Skorospelyi 288 [Early 288] which showed resistance to big bud.

814. MURAŠ, I. G.

**(The varieties and seed production of vegetable crops for indoor cultivation).**

Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 8 : 58-61. [Russian].

Trials of cucumbers and tomatoes suitable for indoor cultivation, with notes on Mičurinite breeding methods, at the RSFSR Institute of Vegetable Farming are reported.

### Cucumber

The most productive varieties were Klinskii 1 and Klinskii 10. High yields were also obtained from Klinskii, Japonskii 16 [Japanese 16] and Senzacija 43 [Sensation 43], which outyielded the control, Lučšii iz Vseh [Best of All]. Great variation was observed in the Klinskii varieties of different origin in respect of morphological and economic characters, including yielding capacity. It is considered that various forms of this variety can be improved by selection and external training. Intravarietal and intervarietal hybridization of the material and its further improvement by the remnant system of selection are advocated.



**Tomato**

Of the 40 varieties tested the most productive, Lučšii iz Vseh [Best of All] and Patriot showed late maturity. Bison and Tepličnyi 8/6 [Greenhouse 8/6] were the earliest varieties and Tepličnyi 8/6 and Gruntovoi Gribovskii [Gribovo Outdoor] showed the highest degree of resistance to diseases.

## 815. STAPP, C.

Eine neue Infektionsmethode mit *Bacterium michiganense*, dem Erreger der bakteriellen Welkekrankheit der Tomaten. (A new method of infection with *B. michiganense*, the pathogen of bacterial wilt of tomatoes).

Phytopath. Z. 1951 : 18 : 111-13.

By the method described, differences in virulence of various strains of *B. michiganense* can be assessed within a few weeks and the varietal differences in the resistance of the tomato host can also be determined.

Essentially the new technique consists in immersing the seedling root system, half of which has been trimmed away, in an aqueous solution of *B. michiganense* for one hour at room temperature and then repotting for observation.

## 816. SCHROEDER, W. T.

**Field reaction of 17 tomato varieties to three diseases in 1949 and 1950 at Geneva, New York.**

Plant Dis. Reporter 1951 : 35 : 160-61. (Mimeographed).

Data presented concerning field reaction to wilt (*Verticillium albo-atrum*), anthracnose (*Colletotrichum phomoides*) and blossom end rot show that differences among varieties were highly significant. No variety possessed the desired degree of resistance to *Verticillium* wilt although Stokesdale, Longred and Wisconsin 55 were moderately tolerant.

## 817.

Kort verslag van excursie naar het Westland. (Short report of an excursion to Westland).

Studiekring voor Plantenveredeling (Plant Breeding Study Circle) 25 July 1947, Wageningen: 162-67. (Mimeographed).

Tomato crosses are being made in an effort to produce a variety as resistant to *Cladosporium fulvum* as Vetomold, but with a better shape and yield. As resistance and shape are determined by single dominant factors, an  $F_1$  was found to be satisfactory and is on the market as Single

Cross. Attempts will be made to breed new varieties resistant to mildew and *strip*, having a good shape, high yield and a strong, branched bottom truss. *Strip* is a form of virus infection in which leaf necrosis is a symptom.

A dwarf bean cross resistant to roll mosaic has been produced and also a type with a bean that is too light in colour, but which acquires the correct tint on freezing.

## 818. BROCK, R. D.

**Resistance to root-knot nematode in tomatoes and beans.**

Aust. Plant Dis. Recorder 1951 : 3 p. 25. (Mimeographed).

The tomato HES 3963 was selected from the back cross of *Lycopersicon esculentum* x *L. peruvianum* for nematode resistance; the results of trials in Victoria have confirmed that the selection possesses resistance. HES 3963 also appears to be highly resistant to *Fusarium* wilt; it has been crossed with commercial varieties.

The bean Alabama 1, reported to be nematode resistant, was almost as susceptible as the control Epicure.

## 819. NORRIS, D. O.

**Spotted wilt resistant tomato varieties.**

Aust. Plant Dis. Recorder 1949 : 1 : 36-37. (Mimeographed).

The Argentine varieties Rey de los Tempranos [King of the Earlyies] and Manzana [Apple] (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 2556) have exhibited a high degree of resistance to spotted wilt virus in artificial inoculation tests at Canberra. The former, a dwarf early type producing a heavy crop of small wrinkled fruit, will probably be of greater value in breeding resistant varieties for Australian conditions than the latter.

## 820. TANAKA, M.

**(Studies on artificial polyploid egg plants. I. The production of tetraploid eggplants by means of colchicine).**

Seiken Jiho (Biological Report) 1950 : No. 4 : 59-65. [Japanese].

Tetraploid strains of 9 varieties have been obtained by colchicine treatment. Fertility in most of the tetraploids was reduced though meiosis was usually regular. The tetraploid strain of Uonumakinchaku [Uonuma Purse]

however showed some degree of recovery of its fertility and in addition was more resistant to insects and drought than the parent diploid.

821. CAPINPIN, J. M., and  
BERENGUER, J. L. (Jun.)  
**A cytogenetic study of parthenocarp  
in eggplant resulting from inter-  
specific pollination.**  
Philipp. Agric. 1950 : 34 : 65-77.

Parthenocarp was not readily induced in five egg plant varieties pollinated by several solanaceous genera under natural conditions at Los Baños, Laguna. Large parthenocarpic fruits were, however, induced in Golden Gate Long Purple by pollen from *Petunia violacea* and in Golden Gate Long Green by *Datura alba* var. *Metel*; variety Native of *Lycopersicon esculentum* stimulated the formation of only very small parthenocarpic fruit in Golden Gate Long Purple, while pollen from *Nicotiana Tabacum* had no effect on any of the varieties.

Although physiological incompatibility in certain interspecific crosses was responsible for differences in the degree of pollen germination and pollen tube penetration, it appears that the ability to develop parthenocarpic fruit is a varietal characteristic.

822. TANAKA, M. and  
SAKAI, S.  
**(Studies on artificial polyploid egg  
plants. II. An experiment on the  
insect resistance of the Uonumashi-  
bai egg plant).**  
Seiken Jiho (Biological Report) 1950 :  
No. 4 : 66-71. [Japanese].

*Epilachna niponica* feeds less on the variety Uonumashibai [Uonuma Tetraploid] than on the parent diploid variety Uonumakinchaku [Uonuma Purse] (cf. Abst. 820).

823. ÅKERBERG, E.  
Svalöfs trindsädessorter. (**Svalöf varie-  
ties of pulses**).  
Allmänna Svenska Utsädesaktiebolaget  
(General Swedish Seed Co.) Svalöf 1951 :  
34-36.

The varieties of peas of various types, vetches and field beans bred by the Swedish Seed Association in recent years are noted, with comments on their suitability for cultivation in various districts of Sweden, since regional adaptation must be taken into account in estimating the value of any variety. Nearly all the varieties named are known to readers of *Plant Breeding Abstracts* but the following, which are

among the most recently produced, are of special interest: the pea Torsdags III [Thursday III] which, with its higher yield in the western parts of central Sweden, could replace the older Torsdags II (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 139); the Nola pea which surpasses even Bottnia in earliness and is grown in Västerbotten and Norrbotten; and the field bean U 01, a line selected at Ultuna from commercial stock for increased yield and a lower 1000 seed weight.

824. BURKE, D. W. and  
STARR, G. H.  
**Studies on bean root rot in northern  
Wyoming.**  
J. Colo. Wyo. Acad. Sci. 1950 : 4 : No.  
2 : 58-59.

Results of trials with 28 types of bean show that in order of decreasing susceptibility the Great Northern varieties are followed by Red Mexican, pinto and snap beans. Among the latter, Cherokee Wax is most resistant. The Scarlet Runner bean has a higher degree of resistance than other varieties from the Cheyenne Horticultural Field Station which are undergoing tests.

Investigations indicate that several forms of *Fusarium* are involved in the root rot complex.

825. MOELLER [MELER], S.  
**[The cultivation of non-irrigated  
vegetables. (Concl.)].**  
Hassadeh 1951 : 31 : 271-74. [Hebrew].

#### Tomato

Garden State, which ripens later than Marmande, has given good results at Naveh Ya'ar and elsewhere.

#### Melon

Tal Haggilboa [Dew of Gilboa] tolerates treatment with sulphur, and yields more prolifically than Hale's Best. Naveh Ya'ar 77 produces large, well-shaped and finely flavoured fruits resembling those of Ananas [Pineapple]. Mekomi [Local] ripens in August, but like most of the late varieties transports badly. The variety referred to as Drosi Misafram, however, though late, transports well. Another variety which has distinguished itself in the trials is Tal Heogen.

#### Bean (*Phaseolus*)

Varieties Brittle Green and Logan have distinguished themselves at Naveh Ya'ar.

#### Bean (*Vicia*)

Naveh Ya'ar 1 was superior to other varieties in its rust resistance and quality.



826. MÜLLER, H. J.  
Über die Ursachen der unterschiedlichen Resistenz von *Vicia faba* L. gegenüber der Bohnenblattlaus *Doralis fabae* Scop. III. Über das Wirtswahlvermögen der Schwarzen Bohnenblattlaus *Doralis fabae* Scop. (**On the causes of the differences in the resistance of *V. faba* L. to the bean aphid *D. fabae* Scop. III. On the ability of the black bean aphid, *D. fabae* Scop. to choose its host**).  
Züchter 1951 : 21 : 161-79.

Davidson's theory of physiological and nutritional causes underlying varietal differences in infestation received little support from the results of comparative tests in Germany of the highly susceptible Schlanstedter field bean and the very resistant Rastatter. Quantitative differences in smell between the two varieties seem to constitute the main factor in determining the incidence of attack. Other possible differentiating factors include taste and, at greater distances, optical impressions. Similar tests on a minor scale with *Acyrtosiphon onobrychidis* showed that this pea pest also differentiates between Rastatter and Schlanstedter, though in this case the mechanism must be different, since the highest incidence of attack was found on Rastatter.

827. LAMPRECHT, H.  
Die Vererbung der Testafarbe bei *Phaseolus vulgaris* L. (**The inheritance of testa colour in *Ph. vulgaris* L.**).  
Agri Hortique Genetica, Landskrona 1951 : 9 : 18-83.

A full survey is given of previous literature, including the writer's own series of papers on the colour genes affecting testa colour in *Ph. vulgaris*, and the complementary action of the colour genes *C*, *J*, *Ins*, *Can*, *G*, *B* and *V* and the modifying genes *Flav*, *Och* and *Vir* is discussed, with an analysis of all the combinations of the last three modifiers in relation to *C* and the basic gene *P*.

In the study of the complementary action of modifiers and colour genes, several hitherto unknown testa colours were synthesized; and it was also found that in the case of some testa colours the same pigmentation might be conditioned by different genetic constitutions. Colours determined by the complementary action of colour factors only may also occur as the result of the action of modifiers on other colour genes. A survey is given of (1) identical, or very similar testa colours, differing in their

genetic basis, and (2) various groups of closely related colours.

All seed coat colours genetically analysed up to the present are reviewed with their designations in English, French and German.

828. LAMPRECHT, H.  
Über die Vererbung der roten Hülsenfarbe bei *Phaseolus vulgaris*. (**On the inheritance of red pod colour in *Ph. vulgaris***).  
Agri Hortique Genetica, Landskrona 1951 : 9 : 84-87.

The genetic basis of the various pod colours hitherto known to occur in *Ph. vulgaris* is recorded. The following results are also given of a cross between a line 903 of a red podded variety of garden bean, received under the name *Ph. glaber*, and line 124, a selection of the stringless snap bean *Konserva*: two genes *Ro* (for *roseus*), conditioning a pink pod, and the other *Pur* (for *purpureus*), changing the pink to purple, can produce the dark purple pod. The actual factorial constitution of each parent for these two factors has not yet been exactly determined, and further crosses are to be made.

829. NIJDAM, F. E.  
Landrassen van stambonen. (**Land races of dwarf beans**).  
Studiekring voor Plantenveredeling (Plant Breeding Study Circle) 18 December 1947, Wageningen: 189-90. (Mimeographed).

The Dutch variety list divides these beans into brown, yellow, white and speckled. Efforts are being made to determine varieties and synonyms.

830. HUBBELING, N.  
Selectieschema's bij zelfbevruchters in het bijzonder bij sla- en snijbonen in verband met vereiste kwaliteit, ziekteresistentie, beschikbare ruimte en arbeidskrachten. (**Selection scheme for self pollinators with special reference to beans for salad and French beans as regards the quality demanded, disease resistance, available space and labour**).  
Studiekring voor Plantenveredeling (Plant Breeding Study Circle) 23 November 1950, Wageningen : 326-38. (Mimeographed).

In 1947 and 1949 heavy attacks of mosaic occurred in Holland, particularly next to plots of infected gladioli, which must be considered to be the most important source of infection. Methods of testing for quality and for disease

resistance are described. Absence of strings and membranes are tested in the field with over-ripe pods. Flavour can also be tested with the raw bean, although new varieties must eventually be cooked. Colour is best checked during summer when the differences are most clearly developed. Susceptibility to virus diseases offers no difficulties at Wageningen, where there are always ample flying leaf aphids. Nor is difficulty experienced in inoculating. Testing with *Pseudomonas* and *Colletotrichum* is possible in the laboratory on germinated seedlings.

In breeding operations, available space must be considered, and also whether time may not be saved by starting line selection in the  $F_2$ , and whether many characters should be worked for at one time, since some must then suffer. An example of quick breeding of a stringless, membraneless, leaf roll resistant dwarf French bean is given. So far it has never been possible to combine complete absence of membrane with very marked earliness. There is a big field for improvement in French beans; types are needed that yield well and are of good quality, stringless and membrane-free. Resistance to disease often accompanies high productivity.

Complete resistance to all physiologic strains of anthracnose may be present in scarlet runners, which are therefore being used in hybridization to introduce resistance.

831. BOLDIN, D.  
(**New high yielding varieties of bean**).  
Kolhoznoe Proizvodstvo (Collective Farming) 1951 : No. 7 : p. 24. [Russian].

As a result of recent state trials several new varieties of *Phaseolus*, remarkable for high yield and resistance to pests and diseases have been made standards.

Belosemjannaja Frunzenskaja [White Seed Frunze] was mass selected at the Frunze Collective Farm, Dnepropetrovsk province. The variety outyields Robjust Ulučšennyi [Improved Robuste] by 3.8 to 6.3 c. per ha. It is a late bean with a growth period of 80 to 95 days and white seed containing 22.8 to 24.9 protein. The 1000 seed weight is 288 grm. The variety shows resistance to drought and halo blight.

Moldavskaja Belaja Mestnaja [Moldavian White Local] produces 10 to 16 c. per ha. under Moldavian conditions. It is a late variety with a growth period of 87 to 105 days, showing resistance to drought, lodging, shedding and anthracnose. The seed is white and has a protein content of 23.5 to 29.5%. The 1000 seed weight is 275 to 320 grm.

Galibiat [Victory] yields 4 c. more per ha. than

other varieties cultivated in Azerbaidžan. It is early, having a growth period of 78 to 84 days, and shows resistance to lodging and tolerance of drought. The seed is white, cooks well and has good flavour. The protein content is 23.5% and the 1000 seed weight 250 to 300 grm.

Mestnaja Piada [Local Piada] does well in the mountainous districts of Azerbaidžan. It is a mid-season variety with a growth period of 95 days. The seed is variegated and of quality equal to that of a local climbing variety Čal-Lobi. The 1000 seed weight is 400 to 450 grm.

832. WATERHOUSE, W. L.

**Bean rust.**

Aust. Plant Dis. Recorder 1951 : 3 : p. 37. (Mimeographed).

The new race of rust attacking Brown Beauty and other dwarf varieties of beans has occurred not only in New South Wales but also in Western Australia (cf. Abst. 835); evidence has been obtained that the new race is superseding the two races formerly present.

833. WILSON, R. D.

**Rust of dwarf French beans.**

Aust. Plant Dis. Recorder 1949 : 1 : 6-7. (Mimeographed).

WATERHOUSE, W. L.

**Rust of dwarf French beans.**

Ibid. 1949 : 1 : p. 7. (Mimeographed).

Tweed Wonder, a variety normally free from *Uromyces* rust, showed infection at Berkeley Vale, NSW. The attacking rust was identified as race 17, using the American standard set of differential varieties. Tweed Wonder, however, shows a resistant reaction to the "standard" race 17.

834. CASS SMITH, W. P.

**Rust of runner beans.**

Aust. Plant Dis. Recorder 1950 : 2 : p. 35. (Mimeographed).

Two races of rust, 2 and 17, have been identified in Western Australia. Natural hybrids between the resistant runner bean Brown Seeded Kentucky Wonder and the popular commercial variety Prolific have been selected for several generations; it is expected that seed of the best line will shortly be released.

- 835.

**Bean rust now attacks dwarf beans.**

Agric. Gaz. N.S.W. 1951 : 62 : 308-09.

A new strain of *Uromyces Phaseoli* var. *typica* has appeared in New South Wales, capable of attacking commercial dwarf bean varieties. At present no dwarf variety resistant to all local



racess is available. Two climbing beans, Westralia and a brown seeded strain of Kentucky Wonder, are however resistant.

836. WILSON, R. D.

**Resistance to anthracnose of Brown Beauty beans.**

Aust. Plant Dis. Recorder 1950 : 2 : p. 50. (Mimeographed).

Some commercial lines of Brown Beauty produced in New South Wales consist of a mixture of anthracnose resistant and susceptible types. One lot contains 100% resistant plants. All strains of Brown Beauty are susceptible to a second strain of anthracnose, recently obtained from Tweed Wonder, but this strain has a somewhat restricted distribution. Seed supplies of Brown Beauty resistant to strain 1 are being produced.

837. HUNGERFORD, C. W.

**Plant breeders develop beans resistant to curly-top.**

Idaho Agric. Sci. 1951 : 36 : No. 3 : p. 5.

The work of the Idaho Agricultural Experiment Station in developing curly top resistant field and snap beans is described. Since 1935, Red Mexican field bean and Burtner snap bean have been the bases of breeding for curly top resistance. Several resistant snap bean selections from recent crosses have shown promising canning quality.

838. THOMAS, W. D. (JUN.).

**Seed-borne red node of pinto beans.**

J. Colo. Wyo. Acad. Sci. 1950 : 4 : No. 2 : p. 59.

The red node virus is transmitted to a limited degree by seed. No apparent correlation was found at the Colorado Agricultural Experiment Station between ability to transmit the virus and seed colour, marking, position in the pod or position of the pod on the infected parent.

839. HINTZE, S.

**Sortförsök med spritböna vid Alnarp och Nyckelby. (Variety trials with kidney beans at Alnarp and Nyckelby).**

Medd. Stat. Trädgårdsförsök 1951 : No. 61 : Pp. 6; also Försök och Forskning 1950 : 7 : p. 85.

The object of these trials in Sweden was to compare some local and older varieties with new varieties. The two Svalöf sister varieties 43/68 and 43/69, which are selections from an old land variety from Ahleborg, gave the highest yields. The best as regards earliness were Eva and Spässerud, but their yield was very low in the localities where they were tested.

840. LAMBETH, V. N.

**Some factors influencing pod set and yield of the lima bean.**

Res. Bull. Mo. Agric. Exp. Sta. 1950 : No. 466 : Pp. 60.

Inadequate fertilization of ovules is one of the main reasons for the frequent failure to obtain satisfactory pod set in many varieties. Several lines of evidence obtained in Missouri indicate that pollen sensitivity, which differs between varieties, is the determining factor. Prevailing water relations and temperatures influence the success of pollination and, ultimately, the number of pods set.

A comparison of the adaptability of varieties shows that Fordhook 242 is more tolerant of low temperatures and excessive soil moisture than others.

841. ELLIS, D. E. and

COX, R. S.

**Control stem anthracnose of lima beans.**

Spec. Circ. N.C. Agric. Exp. Sta. 1950 : No. 11 : Pp. 10.

Differential response of Lima bean varieties to spraying with Parzate, Phygon-XL and Dithane Z-78 for control of stem anthracnose (*Colletotrichum truncatum*) was observed in North Carolina. Disease-free yields of Henderson Bush increased considerably after treatment but sprayed stands of Jackson Wonder and Fordhook 242 yielded only slightly more than non-sprayed controls; Jackson Wonder responded better than Fordhook 242.

842. HARTWIG, E. E.

JOHNSON, H. W. and

CARR, R. B.

**Border effects in soybean test plots.**

Agron. J. 1951 : 43 : 443-45.

Yields of Ogden and Roanoke grown at three places in North Carolina and at Stoneville, Miss., in plots bordered with different strains, showed that competition from the border rows was unequal. Differing yields were obtained both when border strains resembled the plot variety in leafiness, date of maturity and tendency to lodge, and when the border strains and plot types showed extreme variation; thus no valid correction for unequal competition could be made.

Data presented suggest that plots consisting of several rows will give greater accuracy than single rows in trials evaluating soya bean varieties.

843. HUGHES, P. C.

**Six right steps to peak production.**

Soybean Digest 1951 : 11 : No. 5 : 13-14.

The use of soya beans adapted to each particular region is considered to be one of the main factors influencing yield in the USA. A map showing the latest recommendations of the US Regional Soybean Laboratory is appended.

844.

**Varieties for Missouri.**

Soybean Digest 1951 : 11 : No. 5 : p. 10.

Chief, Lincoln and Wabash soya beans are suited to the short growing season of northern Missouri; in the southeastern region, Wabash, S-100, Ogden Ral soy and Arksoy are recommended for crops of varying maturity.

845. ÅKESSON, H.

**En ny värdefull sockerärt. (A new valuable sugar pea).**

Medd. Gullåkers VäxtförädlAnst., Hammenhög 1949 : No. 3-4 : 74-75.

The new pea, Svensk sabel/47 [Swedish Sabre/47] which is a characteristic Sabel type, was obtained by hybridization at the Gullåker Plant Breeding Institute. It is about 170 cm. tall, early, high yielding, and of high quality. In official trials during 1945-47 it was ranked as first class.

846. REYNOLDS, J. D.

**Pea growing in Holland and Belgium.**

**2. Research and advisory work.**

J. Minist. Agric. 1951 : 58 : 223-25.

A succinct account of general breeding work on peas in Belgium and Holland and of varietal testing for resistance to *Fusarium* wilt and near wilt in the latter country is provided.

847. FUCHS, W. H. and

MÜHLENDYCK, E.

**Über den Einfluss der Aussaatzeit und der Temperatur auf die Entwicklung von Erbsensorten. (On the effect of sowing time and temperature on the development of varieties of peas).**

Z. Pflanzenz. 1951 : 30 : 172-87.

The times of flowering and harvesting of garden peas are affected by the time of sowing and the weather during growth and also depend on the variety. Investigations were made to discover whether (1) the time of plucking can be advanced and in summer prolonged, and (2) new regions for pea cultivation can be developed. These problems and varietal reactions to different sowing times are of interest to the breeder in his choice of suitable combinations in hybridization.

848. SCHAAL, W.

**New table pea variety rates high in yield, nematode resistance.**

Crops and Soils 1951 : 3 : No. 8 : p. 28.

The characteristics of Dixielee, bred by the Delta Branch Experiment Station at Stoneville, Miss., are described. The variety has a semibunched habit on the rich Mississippi Delta soils and produces a bunched type of growth in less fertile areas; yields are high regardless of the amount of vine growth. It is of good eating quality and is acceptable for home canning and freezing.

849. LAMMERS, R. P.

**Enige ontwikkelingen in de erwtenveredeling van de laatste jaren. (Some developments in pea breeding during recent years).**

Studiekring voor Plantenveredeling (Plant Breeding Study Circle) 5. January 1949, Wageningen : 240-55. (Mimeographed).

Collections of the six fundamental species: *Pisum formosum*, *P. fulvum*, *P. abyssinicum*, *P. humile*, *P. elatius* and *P. sativum*, and of as many cultivated varieties as possible, should be made and studied for their characteristics and crossability. Peas are self-pollinated in insular climates but cross regularly in continental climates. Twin pods are thought to give higher yields than single or triple, and small peas more than large. The "crooked-beak" type of pod contains many peas and may be linked with the twin pod.

Little is known of varietal behaviour under varying conditions. Descriptions of different types of peas and desiderata are therefore given. Considerable attention was paid to root rots and wilts, the increase of which is associated with decrease in organic manuring. De Haan asserts that crossing with *P. fulvum* introduced a high degree of sterility; after crossing with *P. humile* the offspring were semifertile.

850. D'AMATO, F.

**Mutazioni cromosomiche spontanee in plantule di *Pisum sativum* L. (Spontaneous chromosome aberrations in seedlings of *P. sativum* L.).**

Caryologia, Pisa 1950-51 : 3 : 285-93.

Seeds of the pea Bruco grown in 1946 and kept at room temperature were germinated in 1950 together with controls of the same variety grown in 1950. The germination percentage of the 1946 seeds was reduced to 75, and Feulgen preparations of very young roots revealed a number of fragments and other irregularities



arising from chromosome breakage which had occurred apparently at the presplit stage, probably in the resting nuclei of the radicle before germination began. The effect is thought to be caused by metabolites which accumulate in the cells during the process of aging.

851. GAVRILOVA, V. I.  
**(Intervarietal hybridization of the pea.)**  
 Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 12 : 70-72. [Russian].

At the Ljuleneč Research Breeding Station, the seed setting and yielding capacity of several varieties of pea, including ULSS 303 and 387 [Uladovo-Ljuleneč 303 and 387], have improved after multiple cross pollination. The productiveness of the  $F_1$  was 22% higher than that of the parent forms. Heterosis was maintained in the  $F_2$  and  $F_3$ .

852. KELLENBARGER, S.,  
 SILVEIRA, V.,  
 MCCREADY, R. M.,  
 OWENS, H. S. and  
 CHAPMAN, J. L.  
**Inheritance of starch content and amylose content of the starch in peas (*Pisum sativum*).**  
 Agron. J. 1951 : 43 : 337-40.

Inheritance of seed form, starch grain form, starch content and amylose content of the starch was studied in crosses between smooth and wrinkled varieties. The gene pair  $R_r$ , which determines the inheritance of seed form, may also govern the inheritance of starch grain form and affect the starch and amylose contents. Smooth seed is dominant over wrinkled; high starch content appears to be dominant over low, and low amylose content dominant over high. The data therefore suggest that it will not be possible to breed a smooth seeded pea with high contents of starch and amylose.

853. SCHNEIDER, A.  
 Untersuchungen über die Eignung von Erbsensorten für Zwecke der Nasskonservierung. (**Investigations on the suitability of varieties of peas for wet preserving**).  
 Züchter 1951 : 21 : 97-107.

Work on a number of varieties of marrow fat and shelling peas, showed that the presence or absence of cloudiness and of gelatinization depends not only on the starch content but also on varietal physiological differences. In varieties well suited for wet preserving the total sugar

content, during a storage period of four days, decreases uniformly whereas in other varieties the rate of sugar decrease drops steadily with the length of the storage period. It is suggested that this behaviour is due to transformation of starch into sugar as a result of abnormal carbohydrate metabolism owing to lack of nutrients.

Discovery of the varietal difference in the decrease of sugar on storing made it possible to breed some strains especially suitable for wet preserving; they include the selection Quedlinburger Konservenperle [Quedlinburg Preserving Pearl], now approved as a new high grade variety.

As regards gelatinization the marrow fat varieties studied proved superior to the shelling varieties.

854. SOLOVJEVA, V. K.  
**(New varieties of sugar pea).**  
 Sad i Ogorod (Fruit and Vegetable Gardens) 1951 : No. 6 : 56-57. [Russian].

Breeding peas for a sweet pod without a parchment layer and for the semidwarf habit at the Gribovo Vegetable Breeding Station is reported. Several promising hybrids, including Saharnyi Brovcyna [Brovcyn's Sugar] and Lakomstvo [Delicacy], were obtained from Paramount x Helvetia.

Saharnyi Brovcyna is a semidwarf and produces pods 12 cm. long containing yellowish green seeds of the marrowfat type. The 1000 seed weight is 220 to 250 gm. The flavour of the peas and pods resembles that of Žegalova G-0112, but the new variety is earlier and more productive, and because of its low habit requires no support. The variety yields 155 c. per ha. and shows resistance to *Ascochyta*.

Lakomstvo has similar habit to Saharnyi Brovcyna and produces pods 18 cm. long.

Reference is made to some promising  $F_2$  hybrids from crosses between the two new varieties.

855. GENERALOV, G. F.  
**(The results of varietal trials with pea in the East).**  
 Selekcija i Semenovodstvo (Breeding and Seed Growing) 1950 : No. 12 : 58-61. [Russian].

Several varieties of pea, which have been made standards in the Transural, Siberia, Kazah ASSR and Kirgizian ASSR, are listed, with notes on their yielding capacity, earliness, resistance to *Ascochyta* and other diseases, seed size and colour, protein content, and cooking properties.

The most productive varieties are Grad Amurskii [Amur Hail], Capital, Komsomolec 11 [Komsomol 11], Štambovyĭ 2 [Determinate 2], Puškinskii (= Irlandec [Irishman]), and Urožaĭnyĭ [Productive]. Grad Amurskii shows the highest degree of resistance to *Ascochyta*. Viktoria Mahndorf, Viktoria Rozovaja 79 [Pink Viktoria 79] and Viktoria Strube have 1000 seed weights over 280 grm. and yellowish pink seed.

856. ROBERTS, H. A. and  
WOODFORD, E. K.  
**DNBP for the control of weeds in peas.**

J. Minist. Agric. 1951 : 58 : 268-73.

Preliminary experiments show that pea varieties differ in their susceptibility to 2 : 4-dinitro-6-secondary butyl phenol used as a weed killer.

857. SCHROEDER, W. T.  
**An unusually heavy development of pea enation mosaic on 218 lines of pea in the field.**  
Plant Dis. Reporter 1951 : 35 : 156-60.  
(Mimeographed).

Geneva 168 (PI 140295) was the only line with healthy plants at the end of trials conducted during 1950 by the New York State Agricultural Experiment Station; it has not yet been determined whether these plants were resistant or merely escaped infection.

858. ABDUR RASHID KHAN  
**Correlation studies in gram (*Cicer arietinum*).**  
Pakistan J. Sci. 1949 : 1 : 104-09.

Highly significant positive correlation coefficients in respect of seed yield and readily visible characteristics were recorded at Lyallpur in an analysis of the  $F_2$  from a cross between Pb. 7 and F 8; the latter variety is resistant to gram blight (*Mycosphaerella Rabiei*). It is hoped that the correlation observed in the  $F_2$  between seed yield, total plant size and number of pods will be applied to the selection of desirable high yielding hybrids in subsequent generations.

859. DE MENEZES, O. B.  
Contribuição para o melhoramento do guando (*Cajanus indicus*). [Contribution on the improvement of the cowpea (*C. indicus*)].  
Bol. Inst. Ecol. Exp. Agríc., Rio de J. 1945 : No. 7 : Pp. 57.

Data are given on the chemical composition of the plant and seed in comparison with other legumes, views on its origin, its botanical characteristics, biology of flowering, main

pollinating agents, and technique of hybridization. Beginning in 1942, self pollination has been carried out with a number of cowpeas grown in Brazil, all of which proved genetically impure. A number of different types in respect of flower, seed and pod colour emerged and some of them segregated again when further selfed. The impurity is taken as proof of cross pollination of cowpeas in Brazil.

Positive correlations were observed between length and breadth of pod, number of seeds and length and breadth of pod and between weight of full pod and weight of seeds.

Root tip examinations showed a somatic chromosome number of  $2n = 22$  and pollen mother cell counts showed  $n = 11$ .

860. SMITH, G. M.  
**Hoosier Gold sweet corn.**  
Sta. Bull. Purdue Univ. Agric. Exp. Sta. 1951 : No. 563 : Pp. 6.

The inbreds Purdue G 8, and C 30, a dwarf mutant of Purdue 39, have been released for the commercial production of Hoosier Gold (cf. *Plant Breeding Abstracts*, Vol. XXI, Abst. 2468). The new hybrid is described in detail.

861. STANSFIELD, G. H.  
**The marketing of sweet corn.**  
J. Minist. Agric. 1951 : 58 : 291-93.

Canada Cross, Early Golden Market, Golden Cross Bantam and Extra Early Bantam are the most popular varieties cultivated in southern England. In order to establish a market for sweet corn and to increase public demand it is emphasized that only recommended sweet corn varieties should be grown.

862. JOHNSTONE, F. E. (JUN.) and  
BUSHNELL, J.  
**Field trials of hybrid sweet corn for fresh market, 1948 to 1950.**  
Res. Circ. Ohio Agric. Exp. Sta. 1951 : No. 12 : Pp. 8.

Some 40 of the newer sweet corn hybrids developed in different states have been grown in Ohio for comparison with a few well established varieties such as Carmelcross and Golden Cross Bantam in respect of earliness, yield, quality, height of plants, position of ears and husked ear measurements. Late varieties gave higher yields than early types, particularly on heavy soils.

Mention is made of Flagship (cf. *Plant Breeding Abstracts*, Vol. XVIII, Abst. 2518), a variety with short husks which facilitate picking and marketing.



863. ČELJADINOVA, A. I. and SVJATELIK, N. A.  
(**Methods of increasing the hardness of mint**).  
Agrobiologija (Agrobiology) 1951 : No. 1 : 34-39. [Russian].

In *Mentha piperita*, development of the rhizomes lags behind that of the overground stems, the

immature rhizomes being susceptible to cold. Delayed harvesting hastens maturity of the rhizomes, but reduces the yield of essential oil. Mention is made of varieties 323 and 541 producing higher percentages of mature rhizomes than a population of Peričnaja Proizvodstvennaja [Industrial Pepper] when harvested in August or October.

## BOOK REVIEWS

AUERBACH, C.  
**Notes for introductory courses in genetics.**

Oliver and Boyd, Ltd., London and Edinburgh 1951 : 3rd ed. : 2s. : Pp. 42.

This small booklet consists essentially of a set of lecture notes for students of elementary genetics. Apart from certain undue simplifications which we think would have been better avoided, such as the assertion that "the hereditary material consists of minute structures of the order of size of large molecules, the so-called genes. The genes are arranged in linear order along fine threads, the chromosomes," it is lucid and accurate and comprises as it were a digest of the minimum knowledge the student should have of the principles of genetics. There are concluding observations concerning the special application of genetics to crop and animal improvement and to medicine.

GEORGE, W.  
**Elementary genetics.**

Macmillan & Co., Ltd., London 1951 : 10s. 6d. : Pp. vi + 171 : 68 figs. : 9 tables.

In recent years problems concerning the nature and mode of action of genes and their role in development and in evolution have come within the scope of genetical research, and are providing very interesting results. It is these aspects of the subject which receive special emphasis, though Mendel's laws, linkage and crossing-over, sex determination, mutation, chromosome aberrations and polyploidy also have their place in this remarkably comprehensive little book. It begins with an account of nuclear cytology and the mechanics of cell division which forms an excellent introduction to Mendelism because with this basic knowledge of cytology Mendel's laws are much more readily understood. Throughout the book the explanations are very clearly presented and the examples are well chosen: they are drawn from

both the plant and animal kingdoms and include recent advances in genetical research such as Sonneborn's investigations of cytoplasmic inheritance in *Paramecium* and the work of Beadle and Tatum on *Neurospora* mutants as well as the well known examples one expects to find in text books of genetics.

An error concerning the inheritance of colour-blindness occurs on page 61 where the possibility of a colour-blind woman having received a gene for colour-blindness through her maternal grandmother is ignored.

A point to be recommended is the inclusion of a bibliography, a feature too often lacking in elementary textbooks.

M. T.

KÜHN, A.  
Grundriss der Vererbungslehre. (**Outline of genetics**).  
Quelle und Meyer, Heidelberg 1950 : Pp. viii + 251 : 185 figs.

It is possibly indicative of present-day trends in genetics that in this manual on heredity so much attention is given to modification and variation as opposed to the more familiar static aspects of transmission and conservation of hereditary traits. After a brief introductory essay, chapter II is immediately devoted to modification and includes a full explanation of the binomial curve and of the various ways in which organisms or the expression of their characters can be affected by the environment; this includes a discussion of threshold values and critical periods and various nonhereditary adaptation phenomena. Chapter III describes cell division, fertilization, meiosis and the alternation of generations in various plants and animals, the Mendelian laws, the role of chromosomes and various plasma and plastid differences. There follow chapters devoted to sex inheritance, determination, linkage and ratios and to the different types of mutations. The sixth chapter comprises an exhaustive discussion of gene action and again

shows how the expression of a gene varies under the influence of a range of environmental and other factors, including gene interaction and position effect; a clear exposition of the contributions of fungus genetics is included in this section. Dauermodification and predetermination are dealt with in chapter VII and chapter VIII gives an objective account of the corpuscular and chromosome-molecule theories of the nature of the gene. Species, races and other systematic units form the last topic and again particular attention is given to the factors, both environmental and cytogenetical, which determine their origin and geographical distribution; though mutation, isolation and natural selection are thought to be sufficient to explain the origin of these groups, and even genera, it is not certain whether they can satisfactorily account for the higher systematic units; it is emphasized, however, that no experimental proof exists yet for any assumption of the hereditary establishment of modifications or even dauermodification, and the closing words stress the need for strictly controlled experiments rather than phantasy in approaching this and the other problems that remain unsolved. The argument throughout the book is based on examples drawn from both animal and plant kingdoms and gains greatly from this successful synthesis of fields that are all too often treated separately.

MATHER, K.

**The measurement of linkage in heredity.**

Methuen & Co., Ltd., London and John Wiley & Sons, Inc., New York 1951: 2nd ed. 6s. 6d.: Pp. ix + 149.

The discovery and estimation of linkage are of central importance in much genetical work, and the second edition, coming thirteen years after the first, of Professor Mather's monograph on the subject is most welcome. Statistical methods of analysis are regarded as essential and, although no attempt is made to give an exhaustive account, a wide variety of methods are described, together with many worked examples. After an introductory chapter dealing with the basic Mendelian assumptions of modern genetics and some elementary statistical concepts, the book goes on to discuss the analysis of two-class segregations. Tests for deviations from expected ratios and for the existence of heterogeneity are given. The third chapter contains some notes on the planning of experiments, especially the problem of deciding how many data are required to obtain a reasonable chance of a definitive result. This is followed by a

chapter on the detection of linkage in experimental work using the analysis of  $\chi^2$  by orthogonal functions. From testing for the significance of linkage we turn to its estimations. The next two chapters introduce the method of maximum likelihood and several worked examples are given to facilitate the use of the method by workers without advanced statistical training. Chapter VII deals with combined estimation and tests of heterogeneity, and contains a valuable new section on the use of maximum likelihood *scoring* methods. After this there is a discussion of special techniques for coping with experimental material in which segregation ratios are disturbed by differential viability or incomplete penetrance.

The remainder of the book is concerned with the special difficulties that arise in the analysis of human genetical data. First, there is a discussion of the examination of single factor ratios, especially when sibships with recessive defects are ascertained with a probability proportional to the number of affected individuals they contain. Then comes a brief account of the detection of linkage in man. Both the Penrose sib-pair test and Fisher's method of *u*-statistics are described, but no mention is made of the methods developed by Haldane for the analysis of isolated pedigrees (as opposed to the collection of long series of small family groups). Finally there is a new chapter on the estimation of gene frequencies. This is a useful addition, but it is a pity that the analysis of population data only is given, and that no reference is given to the methods which exist for estimating gene frequencies from family records.

Although several misprints have been corrected since the first edition there are still some outstanding as well as a few new ones. On p. 100 the reference to Fisher should be dated "(1949a)", owing to changes in the bibliography; and in the bibliography itself, on p. 145, the reference to Haldane should be "*Ann. Eugenics*, 7, 28-57". A little more serious is an error in the formula for the variance of *y* on p. 109. If this formula is to refer to "any size of family", the factor 2 in the second bracketed expression should be replaced by (*s*-3), to read  $[1 + y' + (s-3)yy']$ . The same mistake occurs on p. 139 where the formula is given in the list of symbols and formulae. Also on p. 139, the subsequent formula for *y'* should have an "*a*" in the denominator instead of "9". The correct expression appears on p. 109. Finally slight confusion might arise on p. 123, where the numerator of  $\chi^2$  should read

$$(30.5 \times 2.5 - 14.5 \times 2.5)^2 / 50.$$



In spite of these criticisms of detail, Professor Mather's book is undoubtedly one of the best introductions to the statistical analysis of linkage data in genetics, and this second edition will be widely appreciated by all students of the subject.

N. T. J. B.

MORTON, A. G.

**Soviet genetics.**

Lawrence & Wishart, London 1951: 15s.: Pp. 174: tables.

The author of this book on *Soviet Genetics* has set himself a relatively simple task: that of transcribing faithfully and exactly the claims of the Soviet authors and their interpretations of the phenomena of inheritance. This he succeeds in doing with considerable success and in many respects his presentation is more lucid and, we venture to point out, more rational than many of the Soviet originals with which we are familiar in the Russian texts. This is attained partly by omitting or glossing over some of the more controversial aspects of Lysenko's theory, for example the problem of intraspecific competition. No attempt whatever is made to assess the claims critically. They are accepted unquestioningly and taken at their face value. No reference is made to the numerous attempts which have been made outside the Soviet Union to repeat the Russian experiments and have failed (cf. *Plant Breeding Abstracts*, Vol. XI, Abst. 699; Vol. XV, Abst. 1338; Vol. XVII, Abst. 1342; Vol. XX, Absts 733 and 872; and Vol. XXI, Abst. 211). Again, the more bigotted critics such as Huxley and Darlington are countered roundly, whereas objective essays in which the Soviet claims are examined impartially and scientifically are passed over without even a mention. This cannot but detract from the respect with which Dr. Morton's pages can be treated.

We are again struck by the paucity of concrete evidence of the practical results from the Soviet method. We read once more of the conversion of spring to winter cereals and *vice versa*, without being any further persuaded of the utility of these conversions; we are given the following list of Lysenko's achievements: vernalization and summer planting of potatoes in the southern Steppes; the creation of a variety of spring wheat suitable for the same region, which was until recently the standard variety; phenomenal increases in the yield of millet; increased yields of kok-saghyz by cluster planting; solution of the problem of overwintering wheat in Siberia by sowing in the autumn stubble; development of a branched wheat of

great promise; laying down the principles and practice of seed production, which are now having revolutionary effects in raising yields.

This blind acceptance of the Soviet claims is combined with an equal readiness to dismiss the results of careful research carried on over the last fifty years by geneticists in search of some concrete evidence for the inheritance of acquired characters. If such evidence were forthcoming we should be perfectly prepared to consider Michurinism as a rational explanation of the facts. Whether it is the only substitute for Mendelism "to provide a satisfactory alternative", as Dr. Morton suggests, is more doubtful. The efforts of such geneticists as Goldschmidt and Lindegren to modify the gene theory to accommodate many of the exceptions to strict Mendelian segregation with which we are now familiar receive little or no consideration. Nor does the considerable body of data now available which points to a close correlation between chromosome structure and genetical segregation, for which, we are told, the Michurinists "do not pretend to have any detailed explanation". Nor is any suggestion given as to how Michurinism would set about producing sweet lupins, rust resistant wheats, blight resistant potatoes or insect resistant cottons, to quote a few examples of the achievements of plant breeders using the standard methods.

In the presence of two opposing sets of evidence it is surely unscientific to accept one set unquestioningly and reject the other equally unquestioningly, as Dr. Morton does. We agree with him that Lysenko's ideas "cannot simply be dismissed with abuse or ridicule". We submit that what is required is an impartial analysis of his claims and of the honest efforts that have been made, so far unsuccessfully, to substantiate them, and a much more extensive attempt to repeat the Soviet experiments. The present volume contributes nothing on these lines. Though the author seems to have at least certain misgivings concerning the authenticity of some of the claims, in view of such statements as "such an effect, if confirmed, would represent a true vegetative hybridization without nuclear fusion or association, and would strongly support Lysenko's conception of heredity", he nevertheless appears to accept unconditionally the elaborate theoretical superstructure based on these unconfirmed effects and ends with the conclusion that "the Soviet people therefore look forward with confidence to a rapid advance in general wellbeing, and an abundance of all material and cultural

goods of society such as the world has not yet seen".

DOYLE, W. L.,  
RIS, H.,  
SCHRADER, F. and  
HUSKINS, C. L.

**Symposium on cytology.**

Michigan State College Press 1951 :  
\$1.50 : Pp. 69.

The symposium comprises four contributions based on lectures delivered in 1950 at Michigan State College, East Lansing. The aim of the lectures was to bring "to the attention of biologists in other fields some of the major problems, concepts, and directions in the field of cytology". The contributions were as follows:

*Doyle, W. L. Quantitative aspects of the histochemistry of phosphatases. (pp. 1-20).*

It is emphasized that "in a simple solution of a proper set of enzymes one may obtain a successive and orderly series of reactions transforming a particular substance to a new final compound. Without benefit of protoplasmic structural organization, these complex reactions proceed successively in a given direction by virtue of the specificity and concentration of each enzyme", but that in order to avoid entanglements of the various enzymes comprising the many sets at work within a given cell it seems that there must be a high degree of compartmentalization within the limited confines of the cell. Recent research has been much directed towards detecting this "cytoskeleton or architectural matrix within the visibly hyaline, fluid protoplasm," and to localizing the seats of activity of the different enzymes, and the author reviews his own observations on the distribution of phosphatases in animal tissues.

*Ris, H. Recent work on the chemistry of chromosomes. (pp. 21-36).*

A review is given of recent advances in the chemical study of the nucleus, which have demonstrated, among other things, the constancy of DNA in nondividing cells, the variable element being the nonhistone protein fraction of the chromosome, which increases in amount in proportion to the synthetic activity of the cell. Ending with a quotation from Darlington to the effect that "we must be prepared to embrace and reject hypotheses with appropriate recklessness", the author observes that "what the 'new' cytology needs is perhaps a little less recklessness and more chemical and cytochemical analysis".

*Schrader, F. A critique of recent hypotheses of mitosis. (pp. 37-51).*

Various difficulties encountered in attempting to reconcile all mitotic phenomena with the tactoid or the protein chain hypotheses are considered and it is concluded that "both centers and kinetochores obviously play an exceedingly important role in the mitotic cycle, and if it can be determined how and to what degree they may modify and extend the activities of either tactoids or protein chains, many of the apparent objections may be removed."

*Huskins, C. L. Science, cytology, and society. (pp. 53-69).*

This is a stimulating discussion involving some plain speaking concerning what are and what are not the established facts of genetics and cytology. For instance, polysomaty had been repeatedly observed by Bateson, Winkler and others, yet this did not prevent the formulation of the "law of constancy of chromosome numbers" in 1918 and its tacit acceptance ever since. This was in some ways necessary in order to establish the chromosome theory of heredity; it nevertheless illustrates the possible dangers of an authoritarian tradition in a developing science such as cytogenetics. Other examples are given, and a plea is made for a more "scientific" outlook among "statesmen, members of the judiciary, the clergy and other leaders of the people".

BOURNE, G. H.

**Cytology and cell physiology.**

Clarendon Press, Oxford 1951 : 2nd ed. :  
50s. : Pp. xvi + 524 : 33 plates : 130 figs.

The first edition of this book was published in 1942. The manuscript of the new edition, nearly twice as long, was according to the preface completed in 1948, the effective date for judging its composition. Two new chapters have been introduced, one on histogenesis in tissue cultures by Dr. H. B. Fall and the other on some aspects of evolutionary cytology by Dr. E. N. Willmer. The introductory chapter on cytological techniques has been considerably extended by two new sections. One by F. K. Sanders describes a number of special techniques, including freeze-drying methods of tissue preparations, centrifugal fractionation methods of separating cellular constituents, the use of enzymes as histochemical reagents and the histological localization of enzyme activities. The other new section by R. Barer describes the general principles of microscopy and deals also with the powerful recent technical developments employing phase



contrast, interference, fluorescence and reflection microscopy and the electron microscope.

Dr. J. H. Schulman's chapter on the monolayer technique has been considerably enlarged and now stands separately from Professor Danielli's contribution to physical and physiochemical studies of cells. The change in the adjective from physiochemical has not meant any alteration in point of view, but there have been some important additions particularly in connexion with the use of radiations. Dr. White's account of chromosomes, which has been substantially rewritten, is very readable. Similarly, Drs. Blaschko and Sanders' revision of the chapter on intracellular enzymes has been very thorough.

On balance the revisions, alterations and additions have been beneficial. The result is a book incorporating information on the cell ranging from pure morphology to pure biochemistry and biophysics. It is unlikely that any reader will be equally concerned with all parts of it, but it is salutary to specialists to see what other paths are being followed. It should be realized that the point of view is exclusively the animal cell, a bias that could not be corrected by the incorporation of a plant chapter. All textual symposia of this kind suffer from an unavoidable unevenness of treatment and emphasis and perhaps the subject has already become too diverse for there to be a reasonable hope of an integrated account from one pen.

D. G. C.

GIBBS, R. D.

**Botany. An evolutionary approach.**

The Blakiston Company, Philadelphia & Toronto 1950 : \$6.00 : Pp. xiii + 554 : 261 illus. : 118 plates : 26 tables.

A textbook which claims to cater for the beginner and which handles its material in a manner different from the innumerable other text books on the same subject is worthy of attention.

The chief impression gathered from a perusal of this volume is, as one so often finds in things originating from the western side of the Atlantic, of freshness. It is sane, well-balanced, well expressed and possessed of what one might call a scientific humility which is all too rarely encountered. The author disagrees—rightly or wrongly, it does not much matter—with the premise that the first year university student is familiar with the organization of a flowering plant, hence he does not commence with a study of this. He explains that "no arrangement is completely logical and no scheme will please

everyone," and really one wonders if it was altogether necessary to try so hard to do both as it is unlikely that anyone will wish to read the book from cover to cover. However, the evolutionary approach, which is adopted with the assumption that evolution has been, by and large, from the simple to the complex, provides a coherent framework, but the author is full of cautions and does not give any hard and fast genealogies as is sometimes done by the less wise, all the various possible interrelationships between the different groups of plants being broadly indicated and the author of these theories cited. The student who is only vaguely familiar with the concept of evolution and is apt to accept far too readily that the buttercup is "primitive" and the orchid "advanced" without bothering overmuch as to the precise implication of these terms, is gently forewarned by meeting these words in quotes in the text. The tentative nature of evolutionary hypotheses in general is well stressed.

The bulk of the work is occupied with a systematic account of the plant kingdom, embracing all categories. Fundamental processes such as cell division, sexual fusion and photosynthesis, are incorporated where they seem most appropriate, and the student is encouraged to apply his knowledge of physics and chemistry to biological phenomena. Digressions into history are not infrequent and together with occasional excursions into verse contribute to the general interest and readability of the book.

Following the systematic section, topics such as plant products, the soil and plant distribution are discussed, thus completing a thoroughly comprehensive general introduction to botany. A brief treatment of evolution and genetics is included and here as elsewhere the authorities whose views are not cited in detail, as must necessarily be often the case in a survey as broad as this, are at least mentioned by name, giving the student the key to where to go next for further information. Suggestions for further study at the end of each chapter are yet another merit.

The book is clearly intended to be used in conjunction with others, but it would have been better if a glossary had been included, for the student may well be bewildered by the array of technical terms, which although their meaning is made clear when they are first mentioned are not easy to check up on subsequently.

The illustrations, which include many photographs and first class diagrams, very largely original, are another feature lending freshness to the presentation.

R. H. R.

NELSON, A.

**Medical botany.**

E. & S. Livingstone, Ltd., Edinburgh  
1951 : 30s. : Pp. xi + 544 : 13 figs. : 66  
tables : 16 plates.

Dr. Nelson's valuable *Principles of Agricultural Botany* was reviewed in *Plant Breeding Abstracts*, Vol. XVII, p. 99; his *Medical Botany* forms a companion volume, providing like its predecessor, a text book on a field not adequately covered by earlier publications. The title is a little misleading, for besides the account of *materia medica* in section II of the book and of plants pathogenic or allergenic to man in section III, there is a long and detailed treatment in section I of general dietetics. The whole work provides a most useful agglomeration of facts not readily accessible in so convenient a form elsewhere.

The author remarks on the difficulty of arranging the somewhat disconnected material he has to present, and it is perhaps inevitable that any treatment of plants from a medical point of view should tend to meander. The book might, however, have acquired more definition had the author written a little less obliquely. The reader is frequently told that "it may be said that . . .", instead of saying it directly. It seems unnecessary, too, to call a bract a bract-like leaf, and one wonders what lies behind the assertion about fruits that "it is only in areas where the intensity of living is slight that they may be said to provide a major contribution to the energy-supplying part of the diet". Occasionally it is difficult to follow the author's train of thought, as when he remarks that "various degrees of evolutionary development can be shown amongst stinging hairs, but the tendency of all the evolutionary sequences can be shown as following one main line. The hairs of common nettles, *Urtica* spp., may be taken in exemplification". What follows is a straightforward account of the stinging hair of the nettle, leaving the reader quite in the dark as to what evolutionary tendencies are supposed to be exemplified.

The author deserves nothing but praise for the careful way in which he has assembled his facts, though it is hardly correct to say that broom corn is of interest only for making brooms, or to describe the hemicellulose reserves of the date and *Phytelphas macrocarpa* as cellulose. The book would also be more helpful to many if it included structural formulae of some of the organic compounds mentioned.

All those interested in dietetics and pharmacology will be grateful that Dr. Nelson has

directed his flair for compiling texts on applied botany to his field. The kernel of hard fact is so useful that, as in the walnut, "a certain amount of indeterminate tissue known as the packing tissue" will deter nobody.

AUDAS, J. W.

**The Australian bushland.**

W. A. Hamer, Pty, Ltd., Victoria 1950 :  
£4 4s. : Pp. 711 : figs. : tables : illus. :  
plates : maps.

In this large book, Mr. Audas presents some of the wealth of information he has amassed about plants he has found in Australia, and yet, for the major part of the work, it would have been fairer if the book had been given a different name. Some such title as *The Notes of a Botanist in Australian Bushlands* would have given a better idea of the scope of the book, for much of it is in the form of a "Botanical Baedeker".

There are general descriptions of the types of vegetation in various parts of Australia; and with these come special notes on some of the main genera and their species. In all this the outlook is that of a recorder of plants rather than an ecologist or taxonomist.

A large proportion of the text is made up of records of Mr. Audas's travels and his comments on the plants he found. In this way the presentation is almost a catalogue, and one wishes for more help than one gets in appreciating what type of plant any named species may be and what its significance may be. It seems likely that all this was taken from original notes made on the journeys, yet shorn of essential information such as dates. It would be more helpful, for instance, if one were told the time of the year of a certain note so that one could appreciate why it was remarkable that a named species was flowering.

For the rest of the book there are chapters on a wide range of different topics more or less related to the general subject. Fodder crops, grasses and their values, clovers, and plants introduced to Australia are considered. And finally, before the species index, comes a strange assortment of probably independent writings including *Impregnation of Flowering Plants*, *Our Feathered Friends*, *Termites and Erosion*. The sum of all this is a mixture of information in a somewhat ill-assorted form, and yet there is a lot that makes interesting reading. Though this cannot be considered as a comprehensive botanical account, there will be those who will find pleasure in reading at least parts of the



book. They will find, on the whole, that though the standard of printing of the text is excellent, the photographs are decidedly disappointing.

G. E. D.

CATCHESIDE, D. G.

**The genetics of micro-organisms.**

Sir Isaac Pitman & Sons, Ltd., London  
1951: 1st ed.: 21s.: Pp. vii + 223: 35  
figs.: 48 tables: plate.

The study of hereditary phenomena in the microorganisms is one of the fields of modern genetics in which the most spectacular progress has been made in recent years and an authoritative review of this progress is long overdue. The present volume goes some way towards meeting this need. Being based on a course of lectures for biochemists specializing in the microbial aspects of their subject, it attempts no more than to provide an introduction to the general and special aspects of the genetics of microorganisms. It embraces a very wide field, including protozoa and viruses as well as the fungi and bacteria and for these two combined reasons the subject matter suffers what may perhaps appear to some readers an excessive degree of compression. The main results in each of the fields are outlined but the author permits himself no excursions into the more controversial problems of the subjects. Even in discussing those aspects of microbial genetics which are most difficult to reconcile with the classical gene theory, such as non-Mendelian segregations, adaptations and lag in manifestation of bacterial mutants, a rigidly Mendelian outlook is retained, and modifications of the gene theory such as the assumption of cytogene influence, suppressors and latent antigens are preferred to what are referred to as "more elaborate hypotheses".

This volume can thus be said to represent the uncompromisingly Mendelian school in modern genetics even in a field in which the most engaging speculations have been indulged in by various authors to explain the many deviations from strictly Mendelian behaviour that have been observed. The utmost concessions that are made are certain qualifying statements such as that "no completely satisfactory explanation of the delay . . . can as yet be given", "The nature of the suppressive action is as yet obscure", "The particular relation frequencies of recombinant . . . classes cannot in this case be readily understood", and "The reason for this excessive fluctuation in recombination frequency from one experiment to another is unknown".

The book is attractively printed and bound and

contains a selected bibliography relating to each chapter, and an index.

**Annual Review of Microbiology.  
Vol. IV.**

Annual Reviews, Inc., California, USA  
1950: \$6.00: Pp. ix + 333: 2 tables.

E. L. Tatum and D. D. Perkins contribute an excellent review of literature on the genetics of microorganisms, under the main headings of mechanisms of variation, gene mutation, genetic change in populations, mechanism of transmission and genetic recombination, biochemical genetics, and genetics and evolution. Their review deals primarily with papers appearing during the period January 1949 to February 1950 and thus the focus is upon very recent problems and advances. The bibliography, mainly covering a single year of publication only, contains as many as 265 references. F. B. Gordon surveys literature on the genetics of viruses, published mostly during the years 1939 to 1949. This review, which makes an attempt to be exhaustive, is devoted chiefly to animal viruses. C. P. Miller and M. Bohnhoff examine papers concerned with the development of bacterial resistance to chemotherapeutic agents, published during the years 1939-49. The theory that drug resistant individuals in the bacterial population appear as the result of spontaneous mutation, without any direct action of the drug, is shown to be widely accepted among investigators in this field. W. F. Herrell, in his contribution "Newer antibiotics", gives some consideration to the problem of mutation in bacterial response to penicillin and other antibiotics. A scrutiny of literature on bacteriophages by T. F. Anderson includes sections on mutations of the host cells to resistance, bacteriophage mutation and genetic recombination between phages. The remaining contributions have the following wide range: Electron microscopy of microorganisms and viruses, by J. Hillier; Constituents of Mycobacteria, F. B. Seibert; Mutualisms in Protozoa, R. E. Hungate; Bacterial metabolism, L. O. Krampitz; Current trends of experimental research on the aquatic Phycomycetes, R. Emerson; Chemotherapy of virus and rickettsial infections, M. D. Eaton; Antibiosis in relation to plant diseases, R. Weindling; Immunological reactions to viral diseases, H. Koprowski; Immunology of the human mycoses, A. M. Kligman and E. D. DeLamater; Tularemia, L. Foshay; Brucellosis, M. R. Castaneda; and Influence of nutrition in experimental infection, by P. F. Clark.

BULLER, A. H. R.

**Researches on fungi. Volume VII.**

**The sexual process in the Uredinales.**

The University of Toronto Press and Geoffrey Cumberlege, London 1950 : \$13.50 (£6 0s. 0d.) : Pp. xx + 458 : 124 figs.

Prior to his death in 1944 Professor A. H. Reginald Buller had nearly completed the seventh volume in his series *Researches on Fungi*. This volume, *The Sexual Process in the Uredinales*, has now been published by the University of Toronto Press. All who have enjoyed and found inspiration from Professor Buller's publications owe a debt of gratitude to Dr. G. R. Bisby who prepared the book for the press and to the Royal Society of Canada which made publication possible. It would indeed have been a tragedy had this work had to remain an unpublished manuscript.

The volume, of 428 pages, is comprised of 12 chapters and an index. The chapters deal with the discovery of the function of the pycnidia of the Uredinales, the pycnidia and protoaecidia of the Uredinales, flexuous hyphae in the Uredinales in general, the union of pycnidiospores and flexuous hyphae in *Puccinia graminis* and three other rusts, the presence or absence of pycnidia and associated spore forms in certain Uredinales, modes of initiating the sexual process in the rust fungi, comparison of the sexual processes in the Uredinales with those in the Hymenomycetes, a review of cytological work on the sexual process in heterothallic Uredinales, *Cronartium ribicola* and its sexual process, *Puccinia suaveolens* and its sexual process, the genus *Gymnosporangium*, and the geological time during which the pycnidia of the Uredinales attained their present form and function, with some remarks on the evolution of other entomophilous fungi.

The perusal of these chapter headings alone shows that the book will be of the utmost value to mycologists, and indeed to all biologists who are interested in the rust fungi. A mere list, however, cannot truly convey the measure of the wide field covered for there have been brought together numerous observations and experiments by the author and the findings of many research workers. In each chapter there is a full account of the historical development of knowledge concerning the particular topic under review. Both for research and teaching purposes mycologists will find invaluable this marshalling of information, particularly as some of it has come from sources to which many mycologists do not have easy access.

The author's wide knowledge of the fungi has permitted his critical comparison of the sexual process in the rusts with that in other fungi. Thus, for example, the description of the discovery of heterothallism in the Uredinales is preceded by a section dealing with the growth of knowledge on heterothallism in fungi in general. Throughout, the facts and discussion are set forth clearly with the author's critical mind ever weighing the evidence and pointing out where further research is necessary.

The book has all those features which are associated with the previous volumes in the series. It is profusely illustrated with photographs and drawings, there is sometimes a sense of drama as in the description of how the author was suddenly brought to realize the function of pycnidia and there is a sense of humour as witnessed by the verses.

The circumstances attendant upon its publication have made it inevitable that the work is not entirely up to date. This, however, cannot detract from its intrinsic value as a record and review of knowledge. Its price will preclude it from being owned by many mycologists, but it is to be hoped that libraries will make every effort to possess it.

M. A. K.

SMITH, K. M.

**Recent advances in the study of plant viruses.**

J. and A. Churchill, Ltd., London 1951 : 2nd ed. : 22s. 6d. : Pp. viii + 300 : 52 figs. : 8 tables.

In 1933 when the first edition of this book (cf. *Plant Breeding Abstracts*, Vol. IV, p. 356) was published a virus had never been isolated and research on plant viruses had been chiefly confined to studies of the symptoms they produce in plants and their relationships with insect vectors. The enormous progress which has been made since that time with the aid of the various new techniques now available has made it necessary for this second edition to be far greater in scope than the first. Among the many subjects discussed are: methods of purifying viruses, their chemical composition and other properties, determining the size of virus particles, studies with the electron microscope, naturally occurring strains and the production of mutants, the serology of plant viruses, the control of virus diseases, and problems of classification and nomenclature.

The breeding of resistant varieties of plants is briefly considered with reference to potatoes, tobacco, peppers, tomatoes and sugar beet; and different kinds of resistance are mentioned. The author reviews the methods of classification



of viruses which have been proposed and points out that Bawden's classification according to serological reactions would be ideal if it could be applied to viruses as a whole. Possibly at some future time when sufficient data have been accumulated it will be. The reader is left to form his own opinion as to which system should be used at present.

Because of the great diversity of the different branches of research on plant viruses, a comprehensive review is most opportune, and workers concerned with virus diseases will find the book extremely useful. M. T.

FRIMMEL, F.

Die Praxis der Pflanzenzüchtung.

(**Practical plant breeding**).

Paul Parey, Berlin 1951 : Pp. 159 : 13 figs. : tables.

This is a book for would-be plant breeders by a plant breeder. It encompasses the accumulated experience of a lifetime of practical breeding work and can be recommended to any would-be breeder who can read German. It is not a mere formal recital of how to apply the Mendelian laws to plant breeding, for information on which the reader is referred to a previous work by Kappert (cf. *Plant Breeding Abstracts*, Vol. XIX, p. 647). It comprises a series of essays on the different aspects of plant breeding technique, in which the difficulties are never underestimated and special problems thoroughly and helpfully examined and defined. Explanations of genetical principles are introduced at points in the discussion of practical methods at which they are most appropriate, thus avoiding a tedious pedagogical atmosphere and attaining a degree of descriptive continuity rare in text books of this kind. Almost every page contains some sound practical advice, graphically and sometimes whimsically expressed: "die Amtsstunden der Bienen", we read, "beginnen nämlich früher als die der Züchter, man kommt meist zu spät".

The first part of the book is devoted to remarks on the various processes of plant breeding in general (with the exception of fields trials and their statistical treatment, which receive only passing mention); the second half to the special problems presented by the different groups of plants, such as self-pollinated crops, vegetatively reproduced crops, ornamentals, forage plants and other cross-pollinated plants, maize and other heterosis plants, root crops, vegetables, fruits and forest trees. In the discussion, opportunities often arise to suggest profitable tasks for future breeders, such as to produce runner bean varieties whose nutation rhythm

corresponds with the photoperiods of the temperate zones.

The book ends with an alphabetical list of the technical terms most frequently employed in plant breeding, to each of which is appended a definition, sometimes extending to a brief essay, of its exact meaning. The volume, though not entirely free from printer's errors, is attractively produced on excellent paper and is undoubtedly one of the most stimulating books on plant breeding that has appeared for some time.

SCHEIBE, A.

Einführung in die Allgemeine Pflanzenzüchtung. (**Introduction to general plant breeding**).

Eugen Ulmer, Stuttgart 1951 : Bound DM. 19-60, Unbound DM. 18 : Pp. 475 : 122 figs.

The text of this volume consists of a slightly elaborated version of a set of lectures on plant breeding delivered by the author in various German universities. In the introduction, not only the genetical but also the general biological foundations of modern plant breeding are explained and the work of early breeders such as Knight, Hallet, Shirreff, Vilmorin, Rimpau and Fruwirth is described. The following lectures are devoted to the basic principles and different types of reproduction in plants, the chromosome theory and the laws of inheritance, the influence of environment, the statistical analysis of variation in natural and hybrid populations and the various phenomena of modern cytogenetics. Special chapters are devoted to inbreeding and heterosis phenomena and their practical application and to the value of land varieties and the theory of gene centres, and the final chapters deal with the special practical problems that arise in plant breeding and seed production. A 25 page bibliography and author and subject indexes complete the volume.

26e beschrijvende rassenlijst voor landbouwgewassen met bijlagen 1951.

(**Twenty-sixth descriptive list of varieties of field crops, 1951**).

Rijkscommissie voor de Samenstelling van de Rassenlijst voor Landbouwgewassen, Wageningen 1951 : Pp. 301 : tables.

The 1951 edition of this valuable reference book, issued by the Dutch National Committee for the Compilation of the Variety List for Agricultural Plants, contains all the information one has come to expect from experience of the range covered by previous editions (cf. *Plant Breeding*

*Abstracts*, Vol. XXI, p. 229). Authoritative information is given about large numbers of varieties of cereals, pasture grasses, legumes, root crops, herbage plants, flax, hemp, potatoes, vegetables and other crops plants. A list of synonyms is given for a number of varieties of wheat, barley, rye, oats, potatoes and fodder beets.

The usual indexes and abbreviated commentary in English on the contents of the full Dutch form are again provided and double the value of the list for English readers.

CHESTER, K. S. (Translator).

**Selected writings of N.I. Vavilov.  
The origin, variation, immunity and  
breeding of cultivated plants.**

*Chronica Botanica* 1951 : 13 : No. 1/6 :  
Pp. viii + 366 : \$7.50 : 37 figs.

*Chronica Botanica* Co., Waltham, Mass.  
and Wm. Dawson and Sons, Ltd.,  
London.

While Vavilov's name is so well known internationally, both for his researches on the genetics and breeding of crop plants and for the prominent role he played in the Soviet genetics controversy, many of his major writings are known only from summaries or reviews. The great three volume symposium that he edited and to which he contributed several outstanding articles on the *Scientific Bases of Plant Breeding* has never been translated, though it has long become a classic of plant breeding literature.

The volume under review is a translation by Dr. Starr Chester of Vavilov's introduction, and his articles on the Phytogeographical Basis of Plant Breeding, the Law of Homologous Series in the Inheritance of Variability, the Study of Immunity of Plants from Infectious Diseases, and the Scientific Bases of Wheat Breeding. The translation has been made with care and in general follows the original very faithfully. If anything, the translation errs on the side of scrupulosity, since the tendency to render phrase for phrase naturally results in the lumbering periods of the Russian original reappearing in a language to which they are not adapted. Dr. Starr Chester has allowed himself a little latitude in the rendering of single and plural numbers, and it is not always clear how some of his departures from the original improve the sense. Some of Vavilov's more cryptic sentences have given trouble, and it has to be remembered that while Vavilov's line of thought is usually transparent, his mode of expression is frequently obscure. To take an example, we read on p. 104 of the translation, that "E. Köhler has proposed calling the occurrence of

specialization absolute immunity within the orbit of the given parasite". It is clear from the context that, though *specializacii* is unqualified in the original, it refers to the preceding discussion of specific and generic immunity. In order to render the sense, it requires to be translated into some such form as "this type of specialization". In addition, it is not clear why Dr. Starr Chester has rendered *une* by "within" rather than "outside".

Such small points apart, the translation is an admirable piece of work and is a credit to the translator as well as a fitting monument to Vavilov himself.

GÄUMANN, E.

Pflanzliche Infektionslehre. (The  
theory of plant infection).

Verlag Birkhäuser, Basel 1951 : 2nd ed. :  
Bound Fr. 44.50, Unbound 40.50 :  
Pp. 681 : 467 figs. : 107 tables.

The first edition of Professor Gäumann's monograph (cf. *Plant Breeding Abstracts*, Vol. XVII, p. 357) appeared during the war years when much of the world's literature was not available to the writer. The second edition, which now appears, has been considerably modified to bring it into line with more recent developments. The body of the text remains unchanged, but there are a number of insertions, a few paragraphs have been omitted and some modified. A great number of illustrations have been added and many of the original ones have been improved in quality. Certain typographical errors occurring in the original text have been corrected and there are a number of small improvements. By a slight rearrangement of the illustrations it has been possible to make the various additions without materially increasing the number of pages and all those who have used the original version of this great work can therefore be confidently recommended to acquire a copy of the second edition.

SMOCK, R. M. and

NEUBERT, A. M.

**Economic crops. Volume II. Apples  
and apple products.**

Interscience Publishers, New York and  
London 1950 : \$8.75 : Pp. xvi + 486 :  
87 figs. : 51 + A5 tables.

The volume under review is the second in a series of monographs on the chemistry, physiology and technology of food and food products. The authors are chiefly concerned with the apple fruit after harvest, and with events occurring before harvest which affect its subsequent behaviour. They begin by tracing the



history and distribution of the apple with special reference to the United States and Canada, and go on to discuss apple varieties. In this connexion the chief characteristics of the leading varieties, including their susceptibility to diseases, are tabulated. The development and structure of the apple fruit are outlined with the aid of diagrams, and the chemistry and physiology of the fruit before as well as after harvest are discussed. Reference is made to environmental and cultural factors affecting the chemical composition and physiology but details of culture are not given. Storage problems are discussed at some length, and nearly half the book is devoted to the manufacture of various apple products.

Thus, while chiefly of use to those concerned with the handling, storage and processing of apples this publication contains much that will also be of interest to plant breeders and others whose primary concern is with the production of the crop but who need to know something of the problems confronting the processor. It is well written and well illustrated and gives numerous citations from the relevant literature. M. T.

MARKLEY, K. S.

**Soybeans and soybean products.  
Vol. I.**

Interscience Publishers Inc., New York  
& London 1950 : \$11.00 : Pp. xvi + 540 :  
123 figs. : 92 tables.

This book has been compiled as a further addition to the series of monographs on Fats and Oils presented by Interscience Publishers, New York. As the editor points out, the subject has now become so vast that no one man can have the necessary knowledge to cover the whole field comprehensively. In this case, therefore, the work is that of many authors, each expert in a special part of the subject. These individual contributions became too great to be encompassed in a single book. As a result this volume, first of a pair, contains sections on Production, Structure and Composition and the first four of five chapters on Processing. The other volume will then contain the final chapter of the Processing section and the last section, Utilization, and the indexes.

The major portion of this volume is devoted to the biochemistry of the soya bean and its processing; but the first three chapters—History of Soybean Production, World Production and Trade and Structure and Genetic Characteristics of the Soybean—will be found to give an effective review of the botany and agriculture of the crop. The third chapter, in describing the plant and the seed, giving the details of the genes known to affect the various characteristics, provides a useful collection of such information. There is no section on the genetics of the plant, an unfortunate omission to those interested in this side of the crop, but there has presumably been a necessity to keep the subject matter reasonably close to the interests of those for whom the series as a whole is intended.

The size of the work has allowed a fully detailed handling by the various authors, and the information is available in a well written form, without the generalizations that one fears in such work. And yet the detail is far from "undigested", and the text reads clearly and pleasantly. The tables, diagrams and photographs ably support the text.

The division into two volumes has been arranged so that the two must really be kept together. Page numbers run straight through, and subject and author indexes will be gathered together at the end of the second volume. In this volume the chapter titles of the second appear for guidance to the reader.

If there be further points of criticism, one might single out the decision to place references below the text where they pile up, and can be difficult to find again. This does not apply to the first chapter where references are collected at the end. Perhaps, too, it could have been arranged that the division into the two volumes should not cut across the grouping of the subject matter; though in defence of what has been done, it is probably true that few would wish to have either volume singly. The book will undoubtedly be widely appreciated both as an excellent survey of this important crop and as a valuable book of references on specific details.

G. E. D.

## NEW JOURNALS

### *Acta Agronomica*

*Acta Agronomica* is the organ of the agronomy faculty of the National University of Colombia. The first number, which appeared in December 1950, contained articles on a variety of agricultural topics including one on the production

of polyploid plants by chemical treatment, which has been reviewed in this number of *Plant Breeding Abstracts* (cf. Abst. 66). Enquiries should be addressed to Facultad de Agronomía de Palmira, Universidad Nacional de Colombia, SA.

### ***Agronomía Tropical***

The first number of *Agronomía Tropical*, the organ of the National Institute of Agriculture in Venezuela, appeared in April-June 1951. It is to be dedicated principally to the results of research work carried out at the institute but articles received from elsewhere will also be accepted by special permission of the editorial committee. The journal is handsomely produced on excellent paper, the articles in the first number being in Spanish, with brief summaries in English. Those of interest to plant breeders, namely articles on breeding *Sesamum indicum*, on the use of a new gene for indehiscent anthers in producing maize hybrids, and on the chromosome number of *Schoenocaulon officinale*, have been reviewed in this number of *Plant Breeding Abstracts* (cf. Absts 353, 627 and 636).

It is published by the Instituto Nacional de Agricultura, Macaray, Venezuela, SA.

### ***Annales L'Institut National de la Recherche Agronomique, Série B.: Annales de L'Amélioration des Plantes***

Issued by the National Institute of Agronomic Research of France, this journal is intended to disseminate the results obtained in the various

research laboratories and institutions of the country concerned with plant breeding. In this way up to date comprehensive information will be made available on a variety of subjects. Contributions are expected to come largely from French scientists but the cooperation of foreign plant breeders and geneticists in the form of scientific papers will be welcomed. The majority of the articles in this first volume are reviewed in the present issue of *Plant Breeding Abstracts* (cf. Absts. 214, 390, 431 and 436).

### ***The Australian Plant Disease Recorder***

*The Australian Plant Disease Recorder*, issued quarterly, is described as an "informal" publication for the exchange of information among plant pathologists working in Australia. It is hoped that it will assist in achieving uniformity in the formulation of quarantine regulations, the adoption of standardized nomenclature for pathogens, and possibly the inauguration of an Australian Phytopathological Society. The articles are to be kept in a brief form. A number of them deal with the incidence of disease and pests on varieties and also breeding work on wheat and other crops. Further information is obtainable from the Editor, F. C. Butler, Biological Branch, Department of Agriculture, Box 36a, G.P.O., Sydney, Australia.



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